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Event Monitor™ Trigger System

USER MANUAL
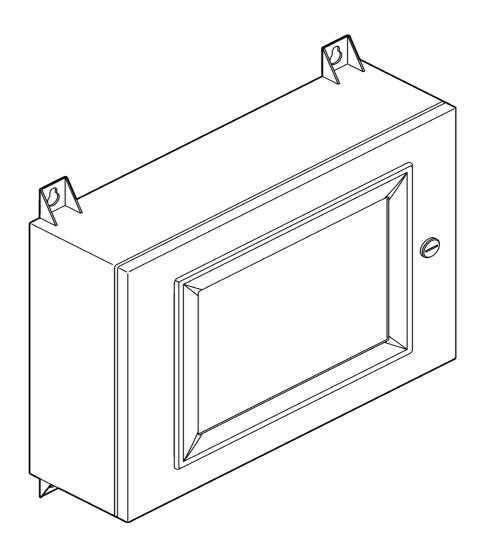
May 2009, Edition 5

Table of Contents

Table of Contents

Section 1   Specifications

Specifications are subject to change without notice.

General	
Dimensions	53 cm (w) x 50 cm (H) x 18 cm (D) (21 in. x 19.5 in. x 7 in.)
Weight	23 kg (50 lb)
Operating Temperature	0 to 40 °C
Storage Temperature	–20 to 65 °C
Maximum Altitude	2000 Meters
Humidity	90% at 40 °C maximum
Display	15" touch screen
Mechanical	
Enclosure	Stainless steel, industrial grade, meets NEMA 4 and IP65, for indoor use
Mounting Options	Wall mount or free-standing rack
Power	
Power Requirements	100–230 VAC, 50/60 Hz, 40 W
Pollution Degree/Installation Category	2/II
Communications	
Sensor Communication	RS485 Modbus for WDMP 2 or PipeSonde
Digital Inputs	1 Digital Input for TOC low gas pressure sensor
Digital Outputs	4 Digital Outputs for external relays—maximum rating 28 VDC/AC, 15 amp
SCADA System	ADAM isolated RS485 Modbus
Data Download/Upload	1 USB Port
Compliance	
Certification	Listed to UL and Certified to CSA Safety Standards (cETLus safety mark) and CE certified

Specifications

Section 2   General information

The information in this manual has been carefully checked and is believed to be accurate. However, the manufacturer assumes no responsibility for any inaccuracies that may be contained in this manual. In no event will the manufacturer be liable for direct, indirect, special, incidental or consequential damages resulting from any defect or omission in this manual, even if advised of the possibility of such damages. In the interest of continued product development, the manufacturer reserves the right to make improvements in this manual and the products it describes at any time, without notice or obligation.

Revised editions are found on the manufacturer's website.

2.1 Safety information

Please read this entire manual before unpacking, setting up or operating this equipment. Pay attention to all danger, warning and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment.

Make sure that the protection provided by this equipment is not impaired, do not use or install this equipment in any manner other than that specified in this manual.

Veuillez lire l'ensemble du manuel avant le déballage, le réglage ou la mise en fonctionnement de cet appareil. Prêtez attention aux prescriptions de danger, avertissements et mises en garde. Le non-respect de cette procédure peut conduire à des blessures graves de l'opérateur ou à des dégâts au matériel.

Assurez-vous que la protection fournie avec cet appareil ne soit pas compromise, n'utilisez pas ou n'installez pas cet appareil d'une autre façon que celle décrite dans ce manuel.

2.1.1 Use of hazard information

DANGER
Indicates a potentially or imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING
Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION
Indicates a potentially hazardous situation that may result in minor or moderate injury.

Important Note: *Indicates a situation which, if not avoided, may cause damage to the instrument. Information that requires special emphasis.*

DANGER
Indique une situation de danger potentielle ou imminente qui, si elle n'est pas évitée, peut entraîner la mort ou des blessures graves.

AVERTISSEMENT
Indique une situation de danger potentiel ou imminent qui, si elle n'est pas évitée, pourrait entraîner la mort ou des blessures graves.

ATTENTION
Indique une situation potentiellement dangereuse qui peut entraîner des blessures mineures ou modérées.

Remarque importante : *Indique une situation qui, si elle n'est pas évitée, peut provoquer des dommages à l'appareil. Informations nécessitant une insistance particulière.*

2.1.2 Precautionary labels

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed.

Lire toutes les étiquettes et tous les repères apposés sur l'instrument. Des personnes peuvent se blesser et le matériel peut être endommagé si ces instructions ne sont pas respectées.

⚠	This is the safety alert symbol. Obey all safety messages that follow this symbol to avoid potential injury. If on the instrument, refer to the instruction manual for operation or safety information. *Ceci est le symbole d'alerte de sécurité. Se conformer à tous les messages de sécurité qui suivent ce symbole afin d'éviter des blessures potentielles. Si apposés sur l'instrument, se référer au manuel d'utilisation pour le fonctionnement ou les informations de sécurité.*
⚡	This symbol indicates that a risk of electrical shock and/or electrocution exists. *Ce symbole indique qu'il existe un risque de choc électrique et/ou d'électrocution.*
🥽	This symbol, if noted on the product, indicates the need for protective eye wear. *Ce symbole, s'il est marqué sur le produit, indique qu'il est indispensable de se protéger les yeux.*
⏚	This symbol, when noted on the product, identifies the location of the connection for Protective Earth (ground). *Ce symbole, lorsqu'il est apposé sur le produit, indique l'emplacement du raccordement de mise à la terre.*
⊟	This symbol, when noted on the product, identifies the location of a fuse or current limiting device. *Ce symbole, lorsqu'il figure sur le produit, identifie l'emplacement d'un fusible ou d'un dispositif de limitation du courant.*
⚠	This symbol, when noted on the product, indicates a heavy object and risk of muscle strain or back injury. *Ce symbole, lorsqu'il est apposé sur le produit, indique un risque possible lors du levage.*
🗑	Electrical equipment marked with this symbol may not be disposed of in European public disposal systems after 12 August of 2005. In conformity with European local and national regulations (EU Directive 2002/96/EC), European electrical equipment users must now return old or end-of life equipment to the Producer for disposal at no charge to the user. *Note: For return for recycling, please contact the equipment producer or supplier for instructions on how to return end-of-life equipment, producer-supplied electrical accessories, and all auxiliary items for proper disposal.* *L'équipement électrique marqué de ce symbole ne devra pas être détruit dans les systèmes de destruction publics Européens après le 12 août 2005. En conformité avec les dispositions européennes locales et nationales (Directive EU 2002/96/EC), les utilisateurs européens d'équipements électriques doivent maintenant renvoyer au fabricant pour destruction les équipements anciens ou en fin de vie, sans frais pour l'utilisateur.* *Pour le retour à des fins de recyclage, veuillez contacter le fabricant ou le fournisseur d'équipement pour obtenir les instructions sur la façon de renvoyer l'équipement usagé, les accessoires électriques fournis par le fabricant, et tous les articles auxiliaires pour une mise au rebut appropriée.*

2.2   General instrument information

Important Note: Do not install other applications on the Event Monitor, such as Microsoft Office, games or other software. Such applications will interfere with the normal operation of the Event Monitor. The only applications that have been tested and proven to be compatible are the remote access applications listed in Appendix A of the GuardianBlue Early Warning System User Manual.

The Event Monitor calculates a trigger signal that indicates the significance of a water quality deviation from the established baseline and alerts management and utility personnel to the events occurring in the system. The Event Monitor can use data from the WDMPsc or the original WDMP and TOC sensors.

The Event Monitor provides a continuous, real-time tool for contaminant detection and process control by monitoring and responding to drinking water distribution network changes.

A proprietary interpretive algorithm (US Patent # 6,999,898) is integrated with monitoring sensors, enabling the system to:

• Detect and classify real-world events in the distribution system.

• Monitor and characterize ongoing drinking water distribution operating conditions and water quality.

• Detect and alarm when contaminants are introduced into drinking water distribution networks.

• Link to critical infrastructure protection and response mechanisms.

The system is designed for fixed site installations. Deployment of the system allows for a real-time sensor platform in a distribution network to trigger on a broad spectrum of contaminants.

2.3   Theory of operation

2.3.1   Security

The GuardianBlue Early Warning System is able to accurately detect and assess threat agents and water quality deviations within a water distribution system. Using a dynamic heuristic software application, the GuardianBlue Event Monitor calculates a trigger signal by analyzing the data from the GuardianBlue Water Panel and GuardianBlue TOC sensors and interprets the significance of water quality deviations from the established baseline. All parameter measurements are mathematically analyzed for data patterns and deviations.

When an event occurs, the Event Monitor learns the specific combination of sensor measurement deviations, the unique "fingerprint" of events. The Event Monitor then compares the fingerprint to the plant library and the Agent Library if available. The Agent Library contains agent fingerprints used in the classification of agents that may be introduced into the system.

Note: The Agent Library is an optional item for the Event Monitor and requires an annual subscription to add fingerprints as they are developed. The subscription service guarantees access to the most current version of the Agent Library.

2.3.2 Operations

If no match is found, the unique "fingerprint" is stored in the Plant Library and the Event Monitor alerts operators when it recognizes water quality fingerprints signaling key operational conditions that require attention. Operators can label fingerprints after detection for simplified identification of recurrences. Event labeling provides broad detection capability and categorization not possible with current human-only or instrument-only monitoring technologies.

2.3.3 Event monitor

The Event Monitor is housed in a stainless steel enclosure with a graphical touch screen interface. Using sensor data from either the WDMPsc or the WDMP or the TOC Analyzer, the Event Monitor calculates the normal baseline for the water analyzed at the monitoring site.

After the initial calculation of the baseline, the Event Monitor calculates a dimensionless trigger signal, which indicates the significance of water quality deviation from the established baseline and alerts management and operation personnel to the events occurring in the system.

Over time, as normal deviations for water quality at the monitoring point are identified and programmed into the software, the Event Monitor becomes more precise in the identification of potential contamination events. The Event Monitor houses a plant library. An agent library (6960000) is available for purchase should you want to upgrade your system to a water security system.

2.3.4 Plant library

The plant library is empty when it is delivered to the installation site and is primarily used for operational purposes. As water quality deviates, events are captured in the plant library. Operators can identify and name events as they occur based on cause, e.g. water source change or chlorine flush. Operators can assign a priority of either normal, warning or alert, which will create an event fingerprint. The next time the event is observed, the Event Monitor will display the fingerprint name and priority, allowing for continuous feedback of water process variation and severity.

Section 3   Installation

DANGER
Only qualified personnel should conduct the installation tasks described in this section of the manual.

DANGER
Seul le personnel qualifié doit effectuer les tâches décrites dans ce chapitre du manuel.

3.1   Unpacking the instrument

CAUTION
Heavy Object. Can cause muscle strain or back injury. Use lifting aids and proper lifting techniques when moving.

ATTENTION
Objet lourd. Peut causer une élongation musculaire ou une blessure au dos. Utilisez du matériel de manutention et une technique correcte pour soulever l'instrument lorsque vous le déplacerez.

Remove the Event Monitor Trigger System from its shipping carton and inspect it for any visible damage. Refer to Figure 1 to identify the main components. Contact Hach Customer Service at 1-800-604-3493 if any items are missing or damaged.

3.2   Mechanical installation

In order to install the Event Monitor, the customer will need to supply the following equipment:

- Mounting hardware
- Conduit fittings
- Cable strain relief
- Relays
- Alarms
- Level

3.2.1   Mounting requirements

DANGER
The instrument must be securely fastened to ensure the instrument does not cause any bodily injury to the user. Failure to mount the system in a suitable location could cause the unit to become a hazard to personnel and equipment.

DANGER
L'instrument doit être fixé fermement pour assurer qu'il ne puisse causer aucun dommage corporel à l'utilisateur. Le fait de ne pas installer le système dans un emplacement adéquat pourra avoir pour conséquence que l'unité représente un danger pour le personnel et l'équipement.

CAUTION
Heavy Object. Can cause muscle strain or back injury. Use lifting aids and proper lifting techniques when moving.

ATTENTION
Objet lourd. Peut causer une élongation musculaire ou une blessure au dos. Utilisez du matériel de manutention et une technique correcte pour soulever l'instrument lorsque vous le déplacerez.

Installation

The Event Monitor Trigger System must be securely mounted to a structure that will hold a weight equal to four times the weight of the entire unit (200 lb). The unit can be mounted to a wall or on the free standing rack. Refer to Figure 1 and Figure 2 for mounting dimensions.

The enclosure must have complete vertical and lateral support. The manufacturer recommends using metal framing, such as Unistrut® for mounting. Use four $3/8$ in. x 2 in. bolts when mounting to a wall.

Make sure the area where the system will be installed has sufficient clearance for opening the door and installation of conduit and cable connections. Make sure all necessary entry holes are prepared before mounting the instrument. Maintain a minimum space of 12 inches on all sides (front, top, sides, and bottom).
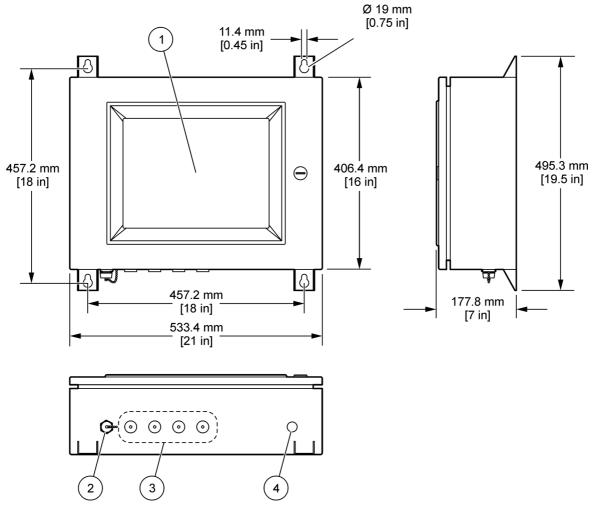
Figure 1   Mounting Dimensions (front, side, and bottom view)

1	Touch screen	3	Wiring access openings (4x)
2	USB connector	4	Power conduit opening
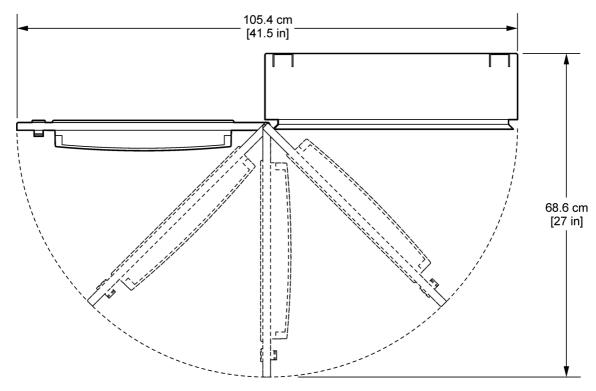
Figure 2   Door swing dimensions

3.2.2   ⚠️ Wiring safety information

DANGER
Always disconnect power to the instrument when making electrical connections.

DANGER
Toujours couper l'alimentation de l'appareil pendant les connexions électriques.

When making any wiring connections to the Event Monitor, the following warnings and notes must be adhered to, as well as any warnings and notes found throughout the individual installation sections. For more information refer to section 2.1 on page 5.

3.2.3 ⚠️ Electrostatic discharge (ESD) considerations

Important Note: To minimize hazards and ESD risks, maintenance procedures not requiring power to the analyzer should be performed with power removed.

Delicate internal electronic components can be damaged by static electricity, resulting in degraded instrument performance or eventual failure.

The manufacturer recommends taking the following steps to prevent ESD damage to your instrument:

- Before touching any instrument electronic components (such as printed circuit cards and the components on them) discharge static electricity from your body. This can be accomplished by touching an earth-grounded metal surface such as the chassis of an instrument, or a metal conduit or pipe.

- To reduce static build-up, avoid excessive movement. Transport static-sensitive components in anti-static containers or packaging.

- To discharge static electricity from your body and keep it discharged, wear a wrist strap connected by a wire to earth ground.

- Handle all static-sensitive components in a static-safe area. If possible, use anti-static floor pads and work bench pads.

3.3 ⚠️ Electrical installation

DANGER
The instrument must be installed by qualified technical personnel for adherence to all applicable electrical codes.

DANGER
L'instrument doit être installé par un personnel technique qualifié pour respecter tous les règlements électriques en vigueur

The instrument is designed for permanent (hard-wire) installation only. A local disconnect designed to meet local electrical code is required and must be identified for all types of installation.

3.3.1 ⚠ Hard-wiring power to the instrument

DANGER
The instrument must be securely fastened to a wall or mounting rack to ensure the instrument does not cause any bodily injury to the user. Failure to mount the system in a suitable location could cause the unit to become a hazard to personnel and equipment.

DANGER
L'instrument doit être solidement fixé au mur ou sur une étagère de montage pour assurer qu'il ne puisse causer aucun dommage corporel à l'utilisateur. Le fait de ne pas installer le système dans un emplacement adéquat pourra avoir pour conséquence que l'unité représente un danger pour le personnel et l'équipement.

Important Note: When using customer-supplied conduit fittings, select the style of conduit hardware that will seal and maintain the environmental raiting. Make sure the enclosure wall is sealed when using flexible or rigid conduit.

To wire the instrument for power, do the following:

1. With a flat-blade screwdriver, turn the door latch mechanism counter-clockwise and open the door.

2. Attach a conduit fitting to the power opening on the bottom of the instrument (Figure 3). Route the AC power wires through this opening.

3. Verify that a circuit breaker with sufficient current capacity is installed in the power line. The breaker size is based on the wire gauge used for installation. The Event Monitor draws a maximum of 4 Amps at 100 VAC, 2 Amps at 230 VAC. Use a Ground Fault Interrupt Circuit if installed in a wet condition.

4. Wire to meet local wiring codes. Wire insulation must be rated for at least 300 V, 60 °C.

5. Connect the green 16–18 gauge ground wire to the ground stud (labeled with the protective earth ground symbol) (Figure 3).

6. Connect 100–230 VAC, 50/60 Hz power to the Main Power terminal block inside the enclosure. Connect the 16–18 gauge Hot and Neutral wires to the appropriately marked screw terminal. Refer to Figure 3 and Table 1. Do not leave any bare wire exposed.

7. Close the instrument door and secure the latch mechanism.
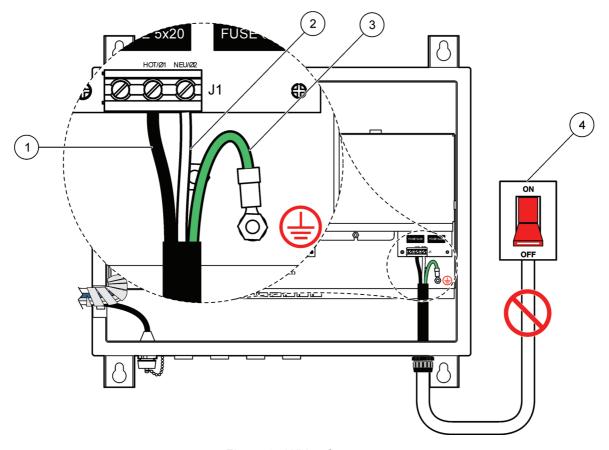
Figure 3   Wiring for power

1	Hot wire (black)	3	Ground wire (Green)
2	Neutral wire (white)	4	Power switch

Table 1   Power wiring information

Terminal Description	Wire Color Code for North America	Wire Color Code for EU
Hot (L1)	Black	Brown
Neutral (N)	White	Blue
Ground	Green	Green/Yellow

3.4 ⚠️ Cable connections to the WDMPsc or PipeSonde

DANGER
The instrument must be installed by qualified technical personnel for adherence to all applicable electrical codes.

DANGER
L'instrument doit être installé par un personnel technique qualifié pour respecter tous les règlements électriques en vigueur.

DANGER
Always disconnect power to the instrument when making electrical connections.

DANGER
Toujours couper l'alimentation de l'appareil pendant les connexions électriques.

Important Note: The Event Monitor can be connected to an original WDMP only through an optional circuit board designed for this purpose. The optional circuit board is a factory installed item. For directions on how to connect the Event Monitor to the optional circuit board, refer to section 3.7, Optional circuit board for WDMP connection on page 18.

The Event Monitor must be connected to a Water Distribution Monitoring Panelsc or Pipe Sonde. Only one sensor package can be selected at a time.

Installation requires connecting the RS485 Modbus cable from the WDMPsc or PipeSonde to the Event Monitor. Refer to Figure 4 and the following instructions for proper installation.

1. Disconnect power to the instrument.

2. With a flat-blade screwdriver, turn the door latch mechanism counter-clockwise and open the door.

3. Attach a conduit fitting to the bottom-right hole on the Event Monitor cabinet. Route the RS485 wires from the WDMPsc or Pipe Sonde through this opening.

4. Connect the RS485 wires to the terminal block as shown in Figure 4.

5. Close the Event Monitor door and tighten the latch mechanism.

6. Connect power to the instrument.

3.5 Event Monitor to sc1000 controller connection

Refer to Figure 4 and the following directions to connect the sc1000 controller to the Event Monitor.

1. Thread the communication cable from the sc1000 controller into the Event Monitor.

2. Connect the white wire to RS485 IN (+) on the T5 terminal block.

3. Connect the green wire to RS485 IN (–) on the T5 terminal block.
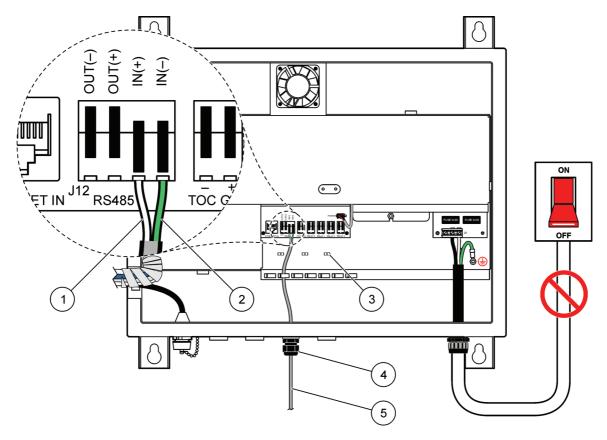
Figure 4   RS485 terminal

1	White wire of sc1000 cable	**3**	Conduit fitting
2	Green wire of sc1000 cable	**4**	Communication cable

3.6 ⚠ Cable connections to alarms and relays

DANGER
Always disconnect power to the instrument when making electrical connections.

DANGER
Toujours couper l'alimentation de l'appareil pendant les connexions électriques.

DANGER
Relay connections are only for low voltage connection (voltage must not exceed 28 VDC/AC).

DANGER
Les relais de branchement ne sont prévus que pour un branchement de basse tension (la tension ne doit pas dépasser 28 V c.c./c.a.).

The Event Monitor is equipped with four digital outputs which provide 12 VDC at 20 mA for powering external, isolated solid-state power relays, or other similar resistive loads. The external relays must not exceed 28 VDC/AC at 15 amp maximum.

Alarm and Relay functions include:

- Sampler Activation Signal
- Alarm
- Treatment/Chemical Feed 1
- Treatment/Chemical Feed 2

Refer to Figure 5 and Table 2 for relay connection information.
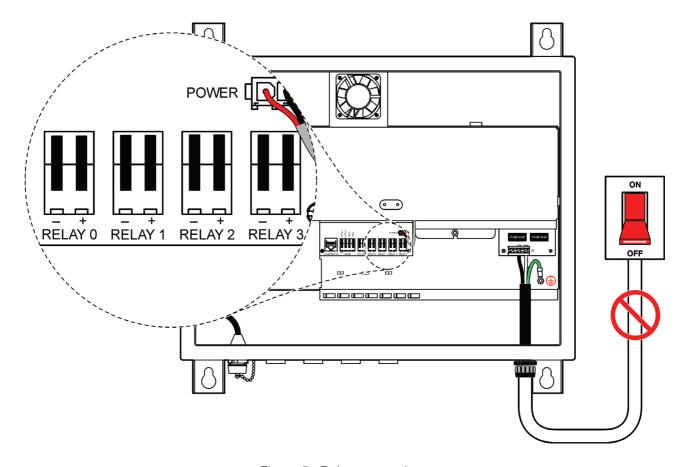
Figure 5   Relay connections

Table 2   Relay connections

Description	From	To
Sampler Activation	+ Relay 0	– Relay 0
Alarm	+ Relay 1	– Relay 1
Treatment/Chemical feed 1	+ Relay 2	– Relay 2
Treatment/Chemical feed 2	+ Relay 3	– Relay 3

3.7 ⚠️ Optional circuit board for WDMP connection

DANGER
Always disconnect power to the instrument when making electrical connections.

DANGER
Toujours couper l'alimentation de l'appareil pendant les connexions électriques.

The Event Monitor can be ordered with an optional circuit board for connection of the Event Monitor to the original Water Distribution Monitoring Panel.

To connect the WDMP to the optional circuit board, do the following:

1. Using a flat-blade screwdriver, turn the door latch mechanism on the Event Monitor counter-clockwise and open the door.

2. Thread the communcation cable through one of the openings on the bottom of the Event Monitor.

3. Insert the stripped ends of the wires from the communication cable into the proper terminals of the connector on the circuit board. Connect the wires as shown in Figure 6 on page 19.

4. Tighten the terminal screws on the connector.

5. Close and latch the Event Monitor door.
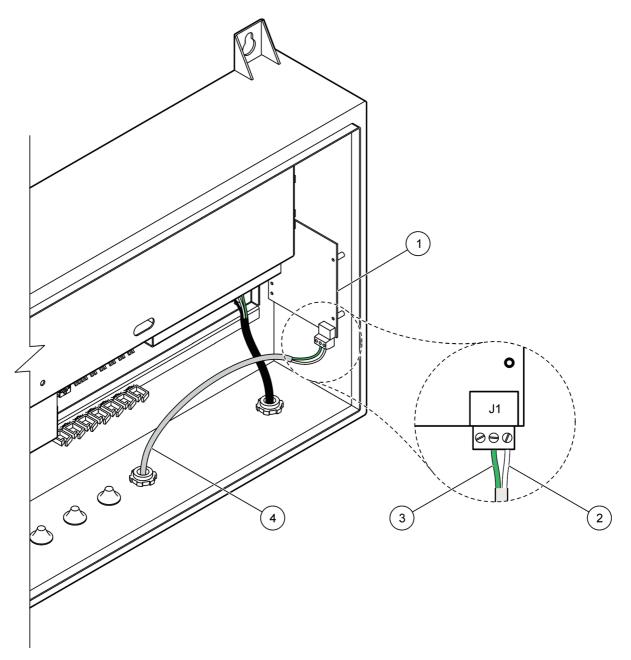
Figure 6   Optional circuit board for original WDMP

1	Circuit board for WDMP connection (optional)	**3**	Green wire of WDMP communication cable
2	White wire of WDMP communication cable	**4**	WDMP communication cable

3.8 ⚠️ Cable connection to TOC Low Gas Pressure input (optional)

DANGER
Always disconnect power to the instrument before making electrical connections.

DANGER
Toujours couper l'alimentation de l'appareil avant les connexions électriques.

The Event Monitor is equipped with a digital input for connection to the TOC Low Gas Pressure Sensor. Refer to Figure 7 and the following instructions.

1. Connect the red wire to the + TOC Gas terminal.

2. Connect the black wire to the – TOC Gas terminal.

3.9 ⚠️ Cable connection to a SCADA system (optional)

DANGER
Always disconnect power to the instrument when making electrical connections.

DANGER
Toujours couper l'alimentation de l'appareil pendant les connexions électriques.

The ADAM isolated RS485 Modbus output can be used for connection to a SCADA system. Make the appropriate connections to the RS485 terminal (Figure 7).
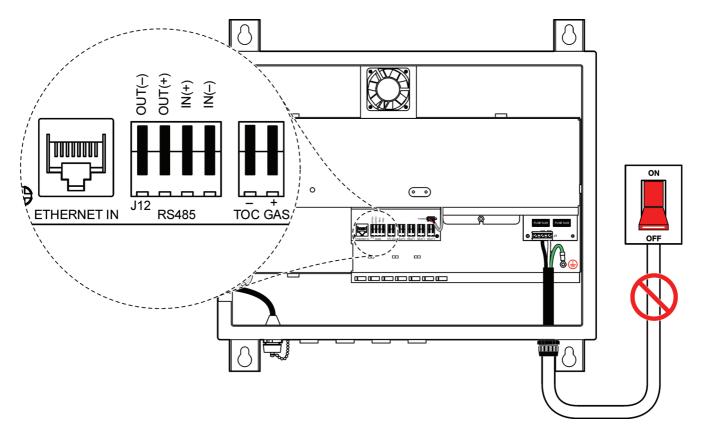
Figure 7   TOC low pressure gas and RS485 terminals

Section 4   Operation

4.1 Event Monitor navigation

The main screen display (Figure 8) is separated into three sections. The top section includes the manufacturer information, site name, logout button and the date and time. This information is present on all screens within the system.

The middle section displays six parameter graphs. Each graph is labeled with the sensor name, unit of measure and current value. The cursor (blue vertical line) is used to show data values anywhere on the graph.

The bottom section includes two task buttons (Configuration and Maintenance), the trigger signal graph and four annunciator buttons (Agent, Plant, System and Sensors).
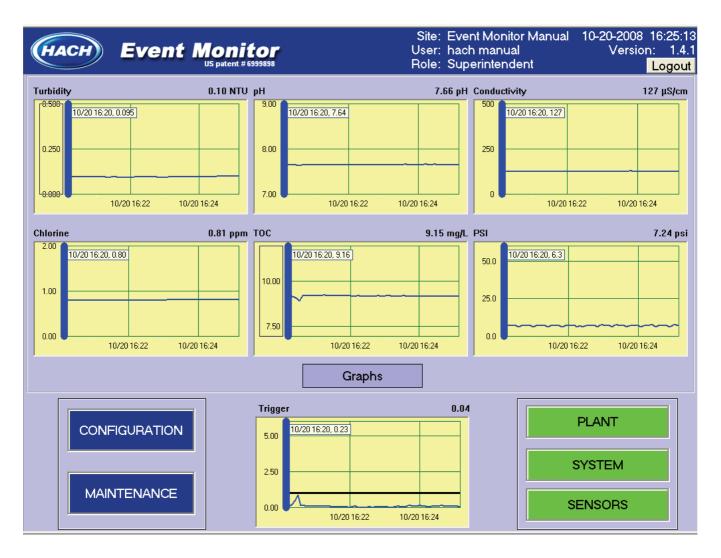
Figure 8 Event monitor main screen

1	Top section	4	Task buttons
2	Sensor graph section	5	Trigger signal graph
3	Graph options button	6	Annunciator buttons

4.1.1 Sensor graphs

Sensor graphs display time on the x-axis and sensor value on the y-axis (Figure 9).

- X-axis: To display sensor data at a specific time, drag the cursor left or right. To view different times, drag the bottom of the x-axis left or right, or adjust the x-axis settings (section 4.1.3.1 on page 23).

- Y-axis: To view y-axis values above or below the values that are displayed on the graph, drag the y-axis up or down, or adjust the y-axis settings (section 4.1.3.2 on page 24).

Single graph zoom

To zoom in on a single graph, double-tap on the graph. The graph will be displayed in a separate window (Figure 9). The minimum, maximum and average values and alarm settings will be displayed.
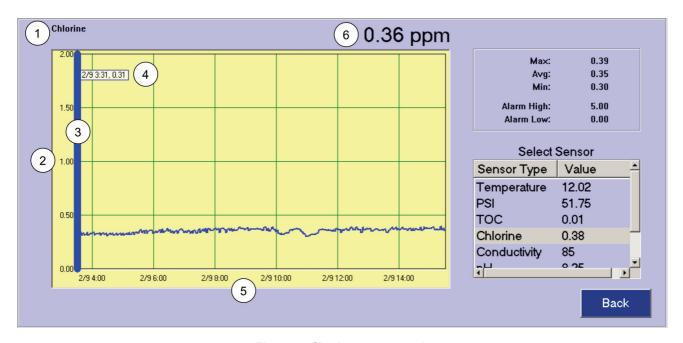
Figure 9 Single sensor graph

1	Sensor name	4	Single data point
2	Sensor values (y-axis)	5	Time (x-axis)
3	Cursor	6	Current sensor value

4.1.2 Trigger signal graph

The Event Monitor combines the data from all of the sensors and calculates a trigger signal. The trigger signal represents the deviation in water quality from the established baseline. The trigger signal graph (Figure 8 on page 21) displays the value of the trigger signal and the selected two thresholds (horizontal lines). When the trigger signal exceeds a threshold value, an alarm will occur and the **PLANT** annunciator button will change color and flash.

4.1.3 Changing graph settings

Select the **GRAPHS** button in the middle of the main screen to modify the x- or y-axis or to select which graphs are displayed on the main screen (Figure 10).
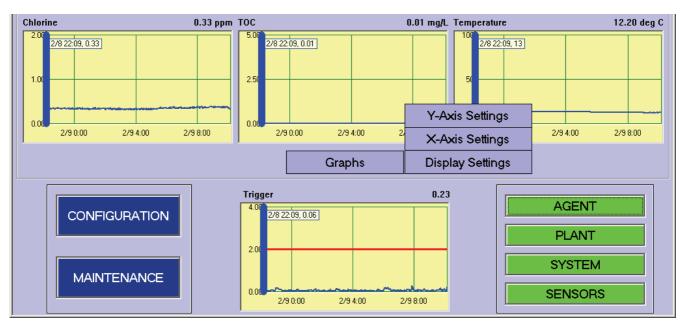
Figure 10 Change graph settings

4.1.3.1 Modifying the x-axis

The settings for the x-axis can be changed to show different time periods, current or historical data and whether the cursor or x-axis moves on all graphs simultaneously or independently.

1. Select **GRAPH>X-AXIS SETTINGS**. The X-Axis Configuration screen will be displayed (Figure 11 on page 24).

2. Select the time period from the **Duration** drop-down list.

3. Select either **Live Data** or **Static Data** to display real-time or historical data. If Static Data is selected, select the start date and time from the drop-down lists.

4. In the Synchronize section, select **X-Axis** or **Data Cursor** to synchronize the data cursor or x-axis movements across all graphs. When not selected, the cursor and x-axis can be moved independently of other graphs.

5. Select **SAVE>OK>BACK** to save and view the changes.
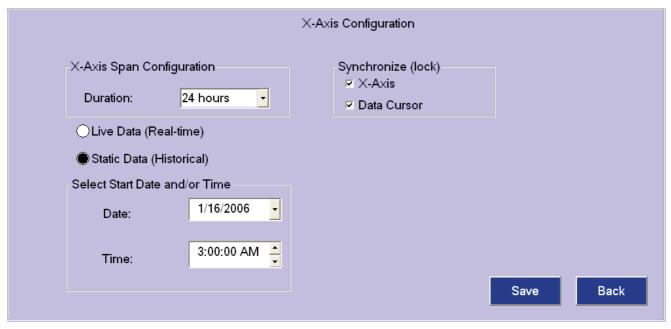
Figure 11 X-axis configuration

4.1.3.2 Modifying the y-axis

The minimum and maximum values for the y-axis can be changed for individual sensor graphs.

1. Select **GRAPH**>**Y-AXIS SETTINGS**. The Y-Axis Scale screen will be displayed (Figure 12).

2. Select a sensor from the Select Sensor Graph list, or select **ALL SENSORS** to adjust the values for multiple sensors.

3. If a sensor is selected, select **Auto** or **Fixed**. When **Auto** is selected, the minimum and maximum y-axis values will automatically adjust based on sensor data.

4. If **Fixed** is selected, highlight the Min Value and Max Value and use the keypad (section 4.1.6 on page 28) to enter new limits for the y-axis. Select **SAVE**>**OK**>**BACK** to save and view the changes in the main screen.

5. If **ALL SENSORS** is selected, a table will be displayed showing the minimum and maximum values for all sensors (Figure 13).

6. Highlight the Min or Max value in the Entry Field column for a particular sensor and use the keypad to enter new limits for the y-axis. Repeat to enter minimum and maximum values for additional sensors. Select **SAVE**>**OK**>**BACK**>**BACK** to save and view the changes in the main screen.

    Note: The values in the Entry Field column can be edited and must fall within the limits shown in the Min and Max columns.
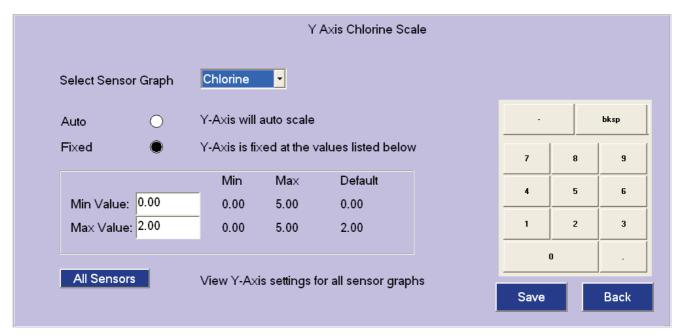
Figure 12 Y-axis configuration—single sensor
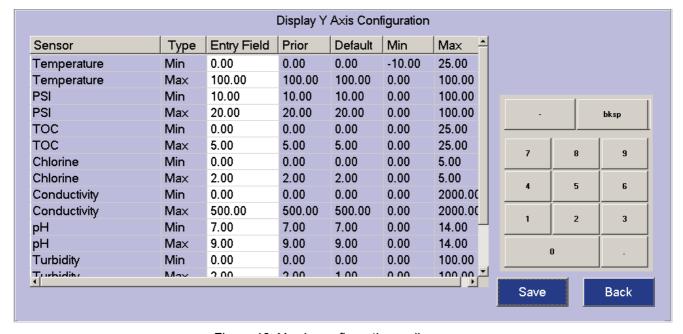
Figure 13 Y-axis configuration—all sensors

4.1.3.3 Selecting graphs to be displayed

The number and placement of sensor graphs displayed in the main screen can be changed.

1. Select **GRAPH>DISPLAY SETTINGS**. The Graph Layout screen will be displayed (Figure 14 on page 26). Six positions are available for sensor graphs.

2. Select a sensor from the drop-down list for each position, or choose none to leave a position blank.

3. Select **SAVE>OK>BACK** to save and view the changes in the main screen.
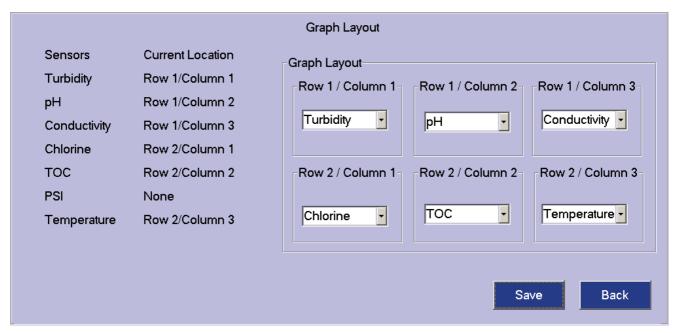
Figure 14 Graph layout screen

4.1.4 Annunciator buttons

There are two types of events that are recognized by the system: plant events caused by operational disturbances, and agent events which are caused by the introduction of undesirable chemicals or infectious agents into the water system.

When agent events, plant events, system errors or sensor errors occur, the annunciator buttons will change color and/or flash. The color of the annunciator buttons indicate the priority level as detailed in Table 3 and Table 4. Press the button to view information about the condition.

Table 3 Annunciator button descriptions

Annunciator Button	Alarm	Alert	Normal	Stable
AGENT	Flash red	Flash yellow	—	Green
PLANT	Flash red	Flash yellow	Blue	Green
SYSTEM	Flash red	Flash yellow	—	Green
SENSORS	Flash red	Flash yellow	—	Green

Table 4 Notification priority levels

Priority	Description
NORMAL	Events assigned NORMAL priority typically do not require corrective action.
ALERT	Events or errors assigned ALERT priority typically include known situations that require corrective action.
ALARM	The highest level priority is ALARM. Known events or errors requiring immediate action are assigned ALARM priority. All unknown events are automatically assigned ALARM priority.

4.1.4.1 Plant alarms

A plant event occurs when the trigger value exceeds the selected threshold value and there is no match to an agent fingerprint. The **PLANT** button will flash **PLANT ALARM** in red, yellow or blue depending on the assigned priority of the alarm. An unknown plant alarm will always flash red. Select **PLANT ALARM** from the main screen to view the date, time, name, priority and number of occurrences.

All plant events are stored in the plant event log (section 4.3.1.3 on page 44). Select **PLANT LOG** from the maintenance screen to view the associated date, time, deviation and statistical details.

Plant events should be evaluated to determine if the cause is due to known seasonal or operational changes. Determining the cause of plant events will help to optimize plant operation and improve efficiency. See Associating a plant event with a root cause on page 60 for more information.

If the cause of the plant event is associated with a known seasonal or operational change, the event can be named in the plant event library (section 4.4.7 on page 54) and assigned a priority level.

When the cause of the plant event has been determined, the plant event can be cleared by selecting **PLANT ALARM** from the main screen and selecting **CLEAR SELECTED**. If no other plant events have occurred, the **PLANT** button will return to a steady green color.

4.1.4.2 System and sensor alarms

When an equipment problem occurs, the Event Monitor will display a system or sensor error notification. The system or sensor button will display the error notification and flash and/or change color depending on the priority level of the error. Select the button to view the error log. A description of possible errors is listed in Table 5 and Table 6.

Every error has an associated priority of warning or failure. A warning is an elevated error priority that signifies a known, identified, non-serious action error condition. Errors that have a warning priority require some type of corrective action. A failure is the highest error priority indicating a serious problem requiring immediate action.

If multiple errors are present, the highest priority error will be displayed. When multiple errors of the same priority occur, the most recent error is displayed. Errors with a priority of warning will be cleared by the system once the error condition has been resolved. Errors with a priority of failure require the user to clear the error by selecting the alert button from the main screen and selecting **CLEAR SELECTED**.

Table 5 System errors

Annunciator button display	Color	Priority	Description
Communication Failure	Red	Failure	Modbus function returns a Mod I/O communication error.
TOC PSI LOW	Yellow	Warning	Low carrier gas pressure to the TOC analyzer.

Table 6 Sensor errors

Annunciator button display	Color	Priority	Description
SENSOR INVALID	Red	Failure	Each sensor is configured with a minimum and maximum signal range. Any sensor that reports values outside the range is classified as invalid.
SENSOR MISSING	Red	Failure	Each sensor reports a value and a status. When a sensor reports a non-normal status, the sensor is classified as missing.
SENSOR FROZEN	Red	Failure	When a sensor reports values that are identical for a specified period of time, it is classified as frozen. The frozen sensor time period is configured when the system is commissioned.

<div align="center">**Table 6 Sensor errors (continued)**</div>

Warning High or Warning Low	Yellow	Warning	When a sensor value falls above or below the specified high and low alarm value, it is classified as a High or Low error.
WARNING SENSORS	Yellow	Warning	When more than one sensor falls above or below the specified high and low alarm value, the Warning Sensors alert will be displayed.

4.1.5 Task buttons

There are two task buttons for configuring and managing the system:

- **CONFIGURATION**: change sensor alarms, plant event settings, site information, users and roles, passwords, logging intervals and digital communication settings ().

- **MAINTENANCE**: view and manage data logs, turn off the trigger signal, reset the baseline, sample, shutdown the Event Monitor and install a software update (and).

4.1.6 Keypads

When entry of information into text fields is required, one of two touch screen keypads will become visible (Figure 15). Highlight the text field, then use the keypad to enter the information.

<div align="center">Figure 15 Alphanumeric and numeric keypads</div>

4.2 Event Monitor configuration

The configuration menu allows authorized users to change the high and low alarm settings, plant event settings, site information, users and roles, passwords, logging intervals and digital communication settings. The configuration menu also includes an emergency contact information screen. The commissioner option allows the user to clear the database, if necessary.

To access the configuration menu:

1. Select **CONFIGURATION** from the main screen. A login screen will appear.

2. Use the keypad to enter the user name and password and select **OK**. If the password is correct, a "User is Authenticated" message box will be displayed. Select **OK**. The Configuration Menu will be displayed (Figure 16).

   If the password is incorrect, a "Username/Password Mismatch" message box will be displayed. Select **OK** and re-type the username and password.
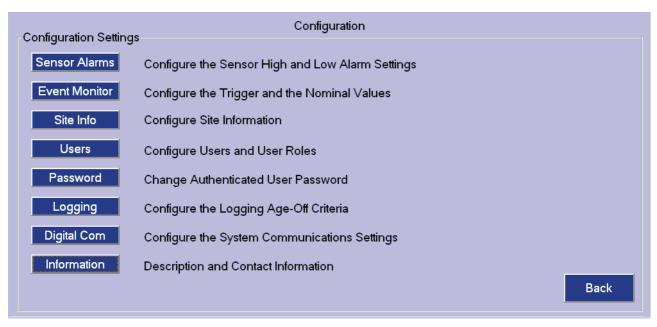
Figure 16 Configuration menu

4.2.1 High and low sensor alarms

A sensor error will occur when a sensor reading is above or below the specified high or low alarm settings.

To change the sensor high and low alarm settings:

1. From the configuration menu, select **SENSOR ALARMS**. A table of sensors and alarm settings will be displayed (Figure 17 on page 30).

2. Select the Hi Alarm or Lo Alarm value in the Entry Field for the appropriate sensor.

3. Enter the new high alarm or low alarm value using the keypad. The new value must be within the range shown in the Min and Max columns.

4. Select **SAVE>OK**. The new alarm setting will be displayed.

5. Change the high and low alarm settings for additional sensors as necessary.

6. Select **BACK** to return to the Configuration Menu.

Sensor	Alarm Type	Entry Field	Prior	Default	Min	Max
PSI	Lo Alarm	5	5	5	0	100
PSI	Hi Alarm	30	30	30	0	100
Temperature	Lo Alarm	0	0	0	-10	50
Temperature	Hi Alarm	25	25	25	0	100
TOC	Lo Alarm	0	0	0	0	2
TOC	Hi Alarm	25	25	25	0.5	25
Conductivity	Lo Alarm	0	0	0	0	1000
Conductivity	Hi Alarm	2000	2000	2000	20	2000
pH	Lo Alarm	0	0	0	0	10
pH	Hi Alarm	14	14	14	7	14
Chlorine	Lo Alarm	0	0	0	0	1
Chlorine	Hi Alarm	5	5	5	0.5	5
Turbidity	Lo Alarm	0	0	0	0	1
Turbidity	Hi Alarm	5	5	5	0.5	100

Figure 17 Alarm settings

4.2.2 Trigger signal thresholds

A threshold value is the upper limit for the trigger signal, above which an event occurs. The value can be set from 0.7 to a maximum of 10. Increasing a threshold value will decrease the system sensitivity. Decreasing a threshold value will increase the system sensitivity to either agent or plant events.
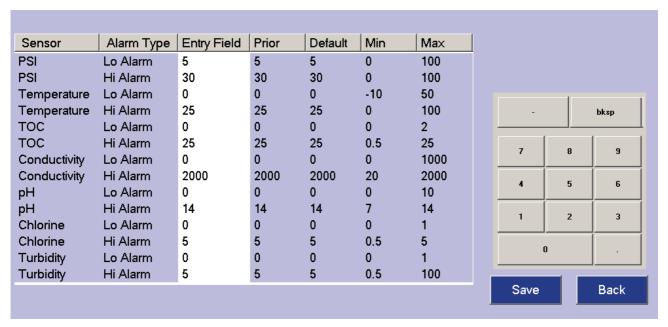
4.2.2.1 Plant vs. agent thresholds

There are two separate thresholds, one for agent events and one for plant events. The separate thresholds allow the user to set the sensitivity of plant events independently from agent events (Figure 18). An agent event typically has a large trigger signal that reflects a significant change from the baseline signal.

A plant event may have a much lower trigger signal when caused by an operation such as a change in source water. Such plant events are useful for detecting changes in system operations, while keeping a distinction from agent events.

If the agent threshold is exceeded but the plant threshold is not exceeded, only the Agent Library is searched. If the plant threshold is exceeded but the agent threshold is not exceeded, only the plant library is searched. If both plant and agent thresholds are exceeded, both libraries are searched for a match.

4.2.2.2 Setting threshold and nominal values

Initial threshold values
Hach recommends initially setting the plant threshold value at 3 and the agent threshold value at 5. Observe the influence of normal plant operations on the trigger signal. After the water quality variability has been determined, adjust the threshold value to an optimal level.

Optimized threshold values
After a few days to several weeks of operation, review the trigger signal graphs for the magnitude of water quality changes. If the changes are well below the current trigger level thresholds, the thresholds can be lowered.

When selecting the optimized agent threshold value, it may be useful to consider the likelihood of an agent threat attack vs. the cost associated with false positives. While false positives are unlikely, they may occasionally occur. Increasing the threshold level will decrease the false positive rate. A true threat may trigger an alarm that appears over an extended period of time and with a relatively high value on the trigger signal.

Nominal values

In the event that a sensor becomes frozen or is missing (Table 6 on page 27), the Event Monitor will use the nominal value for the sensor in determining the trigger signal. The nominal value should reflect the typical or average sensor reading. The agent matching capability will be disabled until all sensors return to fully functional operation.

To change the threshold and nominal values:

1. From the Configuration Menu, select **EVENT MONITOR**. The Event Monitor Configuration screen will be displayed (Figure 18).

2. Highlight the Threshold Value in the Entry Field and enter the new threshold value using the keypad.

3. Highlight the Nominal Value for each sensor in the Entry Field and enter the typical or average reading for each sensor.

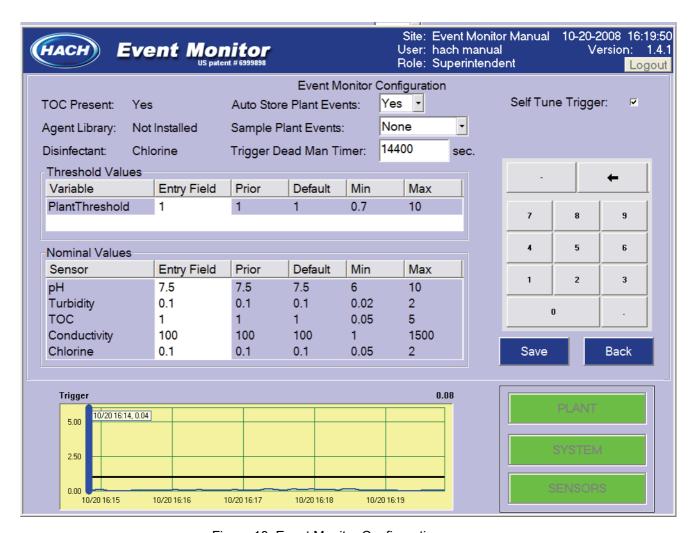4. Select **SAVE**>**OK** to save the new settings. Select **BACK** to return to the Configuration Menu.

Figure 18 Event Monitor Configuration screen

4.2.3 Plant event options

4.2.3.1 Automatically storing plant events

The Event Monitor can be configured to automatically store plant events. A plant event occurs when the trigger signal exceeds the plant threshold value. Select **YES** or **NO** next to Auto Store Plant Events in the Event Monitor Configuration screen (Figure 18 on page 31).

4.2.3.2 External relay settings

The Event Monitor is equipped with four digital outputs for external relays. Fail Safe or Non-Fail Safe settings can be selected in the Event Monitor Configuration screen next to Digital I/O Output Relays.

4.2.4 Changing site information

The site name, ID and location can be specified in the Site Configuration screen. Selections can also be made for the disinfectant being used and whether a TOC analyzer is connected to the Event Monitor.

1. From the Configuration Menu, select **SITE INFO**. The Site Configuration screen will be displayed (Figure 19).

2. To change the Site Name, Site ID, or Location, select the appropriate text field and use the keypad to enter the new information.

3. Select **Yes** next to TOC Present to indicate that the TOC analyzer is connected.

4. In the Disinfectant section, select **Chlorine**, **Chloramine** or **None** if using chlorine dioxide or ozone as a disinfectant.

5. Select **SAVE**>**OK**>**BACK** to save the settings and return to the Configuration Menu.
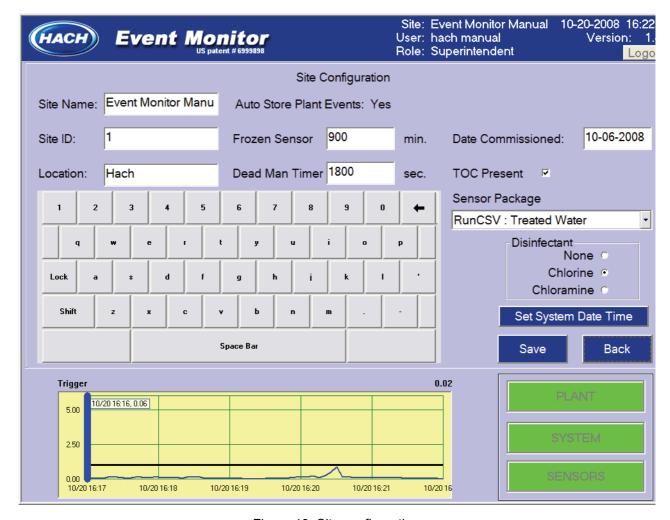
Figure 19 Site configuration

4.2.5 Changing the system date and time

1. From the Configuration Menu, select **SITE INFO**.

2. Select **SET SYSTEM DATE TIME**. The System Date Time screen will be displayed.

3. Select the System Date drop-down list. Select the date from the calendar display.

4. To change the System Time, highlight the hour, minute, seconds, or AM/PM. Use the up and down arrows to increase or decrease the time increment. Hours, minutes and seconds must be changed individually.

4.2.6 Configuring users and access rights

There are six pre-defined Users (Commissioner, Manager, Operator 1, Operator 2, Service, or Superintendent) with pre-defined screen access rights. The combination of access rights for a given user defines the Role for that user. Table 7 shows the access rights for each of the pre-defined users. Users and Roles can be added, modified or deleted.

Table 7   Pre-defined users and roles

Menu class	Screen	Superintendent	Service	Operator
Annunciation	Agent Select All	x	x	x
	Agent Clear Selected	x	x	x
	Plant Clear Selected	x	x	x
	Plant Select All	x	x	x
	System Clear Selected	x	x	x
	System Select All	x	x	x
	Sensor Clear Selected	x	x	x
	Sensor Select All	x	x	x
Configuration	Sensor Alarms	x	x	x
	Event Monitor	x		
	Site Info	x	x	x
	Users	x		
	Reset Password	x	x	
	Password	x		
	Logging	x		
	Digital Com	x	x	
	Information	x	x	x
Maintenance	Sensor Error Log	x	x	x
	System Error Log	x	x	x
	Plant Event Log	x	x	x
	Agent Event Log	x	x	x
	Sensor Data Log	x	x	x
	User Activity Log	x	x	x
	File Save	x	x	x
	Plant Library	x		
	Enable/Disable	x	x	x
	Baseline Reset	x	x	
	Sample Now	x	x	x
	Shutdown	x	x	
	Install Library	x	x	
	Install EM	x	x	
	Import/Export Database	x	x	
	License	x	x	

4.2.6.1 Adding, modifying and deleting a user

To add or delete a user, or change access rights, select **USERS** from the Configuration Menu to access the Manage Users screen (Figure 20).
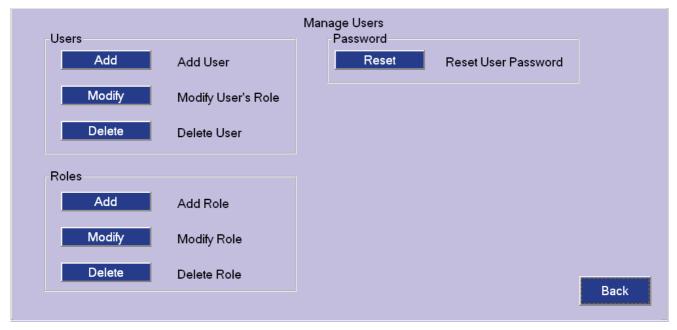

Figure 20 Manage users

Adding a new user

1. From the Configuration Menu, select **USERS**.

2. Under the Users option field, select **ADD**. The Add User screen will be displayed (Figure 21).

3. Select the User Name field and use the keypad to enter the new user name.
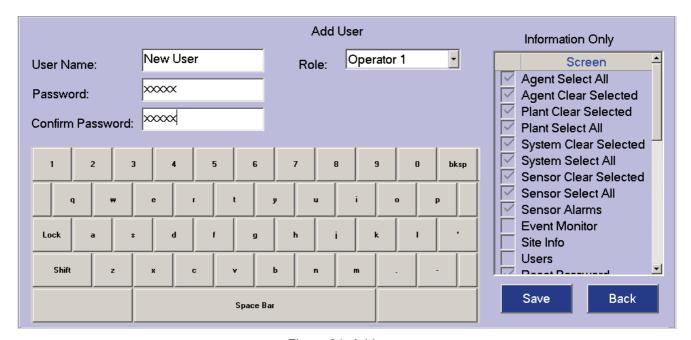
Figure 21 Add user

4. Select the Password field and enter the password. Select the Confirm Password field and re-enter the password.

5. Select the Role for the user (see Table 7 on page 34).

6. Select **SAVE**>**OK**>**BACK** to save the settings and return to the Manage Users screen.

Selecting a user role

1. From the Configuration Menu, select **USERS**.

2. Under the Users option field, select **MODIFY**. The Modify User's Role screen will be displayed (Figure 22). The available options for the selected role (see also Table 7 on page 34) will be listed under Information Only.

3. Select the appropriate user from the User Name drop-down list.

4. Select the appropriate role for the selected user from the Role drop-down list.

5. Select **SAVE**>**OK**>**BACK** to save the settings and return to the Manage Users screen.

Figure 22 Modify user role

Deleting a user

1. From the Configuration Menu, select **USERS**.

2. Under the Users option field, select **DELETE**.

3. Select the appropriate user from the User Name drop-down list.

4. Select **DELETE**>**OK**>**BACK** to remove the user and return to the Manage Users screen.

4.2.6.2 Adding, modifying and deleting a user role

Adding a new role

1. From the Configuration Menu, select **USERS**.

2. Under the Roles option field, select **ADD**. The Define Role screen will be displayed (Figure 23).
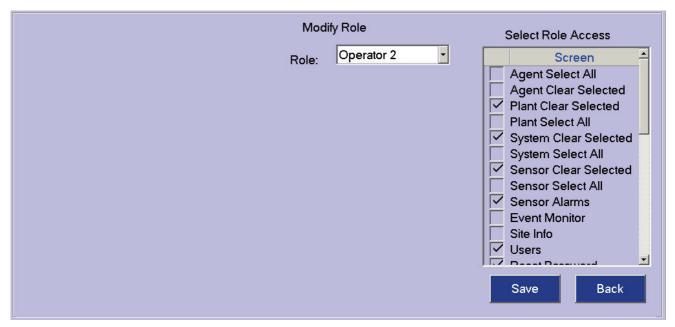
3. Enter a new role name in the Role Name field, for example Operator 3.

4. Select the access options to assign to the new role from the Select Role Access list. Tap the box next to the screen once to select the screen; tap the box again to de-select the screen.

5. Select **SAVE>OK>BACK** to save the settings and return to the Manage Users screen.

Figure 23 Adding a role

Modifying a user role

1. From the Configuration Menu, select **USERS**.

2. Under the Roles option field, select **MODIFY**. The Modify Role screen will be displayed (Figure 24 on page 38).

3. Select the role to modify from the Role drop-down list.

4. Modify the access options for the role by selecting or deselecting screens in the Select Role Access list. Tap the box next to the screen once to select the screen; tap the box again to deselect the screen.

5. Select **SAVE>OK>BACK** to save the settings and return to the Manage Users screen.
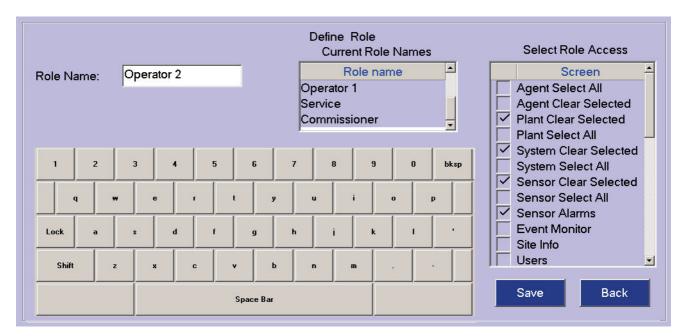
Figure 24 Modify role

Deleting a role

1. From the Configuration Menu, select **USERS**.

2. Under the Roles option field, select **DELETE**.

3. Select the appropriate Role from the Role drop-down list.

4. Select **DELETE**>**OK**>**BACK** to remove the role and return to the Manage Users screen.

4.2.6.3 Resetting a user password

To change the password for a user other than the current user:

1. From the Configuration Menu, select **USERS**.

2. Under the Password option field, select **RESET**.

3. Select the appropriate user from the User Name drop-down list.

4. Select the Password field and enter the password using the keypad.

5. Select the Confirm Password field and re-enter the password.

6. Select **SAVE**. A "Changes Saved" message box will appear. Select **OK** to save the new password.

7. Select **BACK** to return to the Configuration Menu.

4.2.7 Changing a user password

To change the password for the current user:

1. From the Configuration Menu, select **PASSWORD**. The Change Password screen will be displayed for the current user (Figure 25).

2. Select the Password field and enter the new password using the keypad.

3. Select the Confirm Password field and re-enter the password.

4. Select **SAVE**. A "Changes Saved" message box will appear. Select **OK** to save the new password.

5. Select **BACK** to return to the Configuration Menu.

*Note: To change the password for a user other than the current user, select **USERS>RESET** from the Configuration Menu (section 4.2.6.3 on page 38).*
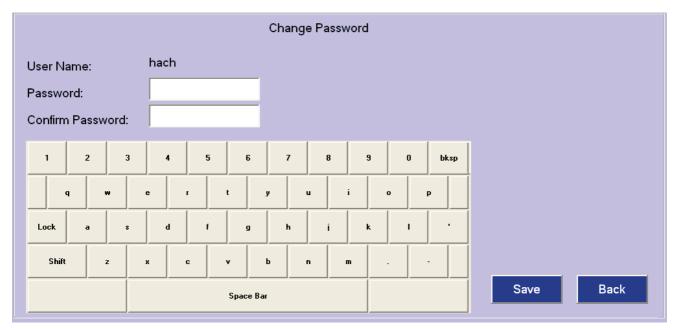
Figure 25 Change password

4.2.8 Changing the data log duration

Data logs can be saved for one to six months. The default setting is 3 months for each log.

To change the Data Log duration:

1. From the Configuration Menu, select **LOGGING**. The Logging Configuration screen will be displayed (Figure 26 on page 40).

2. For each data log, select the time period for saving data. The data log for sensor history can be saved for a maximum of three months, all other logs can be saved for a maximum of six months.

3. Select **SAVE>OK>BACK** to save the settings and return to the Configuration Menu.
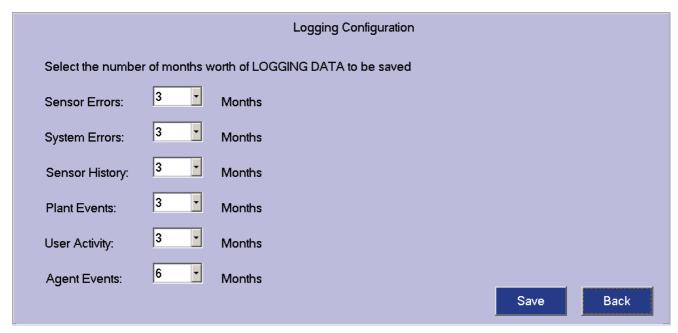
Figure 26 Data log configuration

4.2.9 Configuring communication settings

The communication settings for the Event Monitor are configured for the GuardianBlue Water Panel at the factory. These settings can be changed, if necessary, to connect to a version of the water panel using the AquaTrend controller or to further customize communications.

1. From the Configuration Menu, select **DIGITAL COM**. The Communications screen will be displayed (Figure 27).

2. In the Input Networks section, select the communication settings (port, baud rate, parity-data-stop bit, timeout, silent and retries) from the drop-down list.

3. In the MODBUS-Slave Output Network section, select the communication settings (protocol, address, port, baud rate, parity-data-stop bit, timeout and silent) from the drop-down list.

4. Select **SAVE**>**OK**>**BACK** to save the settings and return to the Configuration Menu.

Register mappings
Refer to Appendix B of the GuardianBlue User Manual for register mapping information.
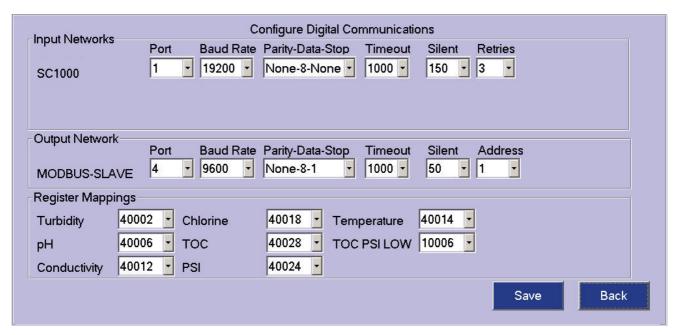
Figure 27 Communications configuration

4.2.10 Emergency contact information

From the Configuration Menu, select **INFORMATION** to display the serial number of the Event Monitor and important contact information (Figure 28). Contact information can be changed by highlighting the contact name or phone number and using the keypad to enter in new information.
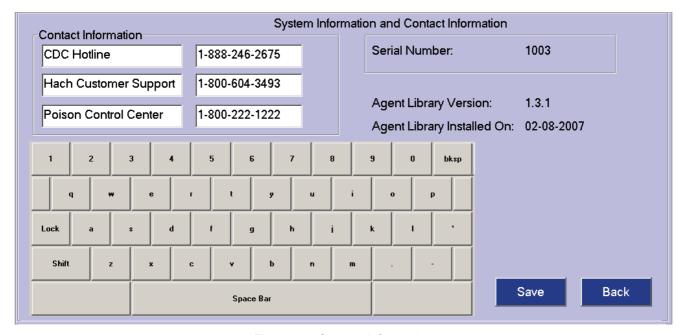
Figure 28 Contact information

4.3 Managing data

During normal operation the Event Monitor gathers a large amount of data and retains the following logs:

- System error log

- Sensor error log

- Plant event log

- Sensor data log

- User activity log

The data logs are stored in the Event Monitor for a user-selected length of time. Logs cannot be retained indefinitely to prevent log files from eventually filling the system memory. Data logs should be downloaded and archived per user requirements.

Alternatively, the logs files in the Event Monitor may be used as a redundant short-term archive when data is transmitted to and stored in a SCADA or other data management system.

Data logs can be viewed, exported and imported in the maintenance menu. The user can also name plant events, turn the trigger signal on or off, or reset the baseline. Select **MAINTENANCE** from the main screen to access the maintenance menu (Figure 29).

Figure 29 Maintenance menu

4.3.1 Viewing data logs

The Manage Data Logs section of the Maintenance Menu allows the user to view the sensor error log, system error log, plant event log, agent event log, sensor data log and user activity log.

4.3.1.1 Sensor error log

Select **SENSOR LOG** from the Maintenance Menu to view the Sensor Error Log (Figure 30). Select an error from the list and then select **DETAIL** to view more information about the error.

Sensor Error Log					
From Date/Time	To Date/Time	Priority	Error	Sensor	# of Errors
01-23-06 11:53:42	01-23-06 11:53:42	WARNING	Warning Low	Chlorine	1
01-23-06 11:53:13	01-23-06 11:53:40	WARNING	Warning Low	Chlorine	24
01-23-06 11:53:10	01-23-06 11:53:12	FAILURE	SENSOR FROZEN	Chlorine	3
01-23-06 11:52:34	01-23-06 11:52:34	WARNING	Warning Low	Chlorine	1
01-23-06 11:52:09	01-23-06 11:52:34	WARNING	Warning Low	Chlorine	24
01-23-06 11:52:06	01-23-06 11:52:08	FAILURE	SENSOR FROZEN	Chlorine	3
01-23-06 11:51:32	01-23-06 11:51:32	WARNING	Warning Low	Chlorine	1
01-23-06 11:51:07	01-23-06 11:51:31	WARNING	Warning Low	Chlorine	24
01-23-06 11:50:49	01-23-06 11:54:22	WARNING	Warning High	TOC	103

1 total page

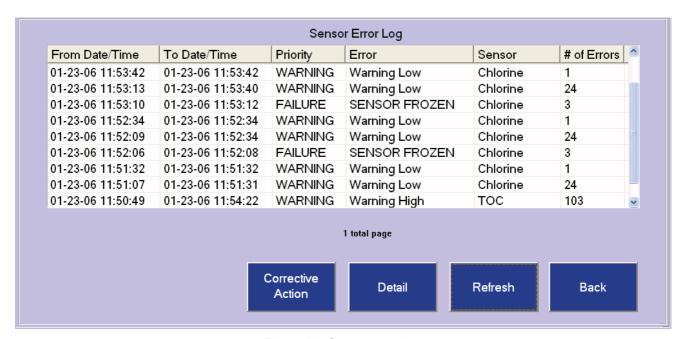Corrective Action   Detail   Refresh   Back

Figure 30 Sensor error log

4.3.1.2 System error log

Select **SYSTEM LOG** to view the System Error Log (Figure 31). Select an error from the list and then select the **DETAIL** button to view more information about the error.
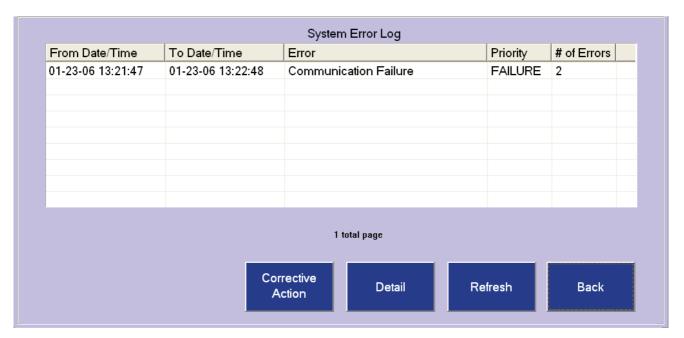
From Date/Time	To Date/Time	Error	Priority	# of Errors
01-23-06 13:21:47	01-23-06 13:22:48	Communication Failure	FAILURE	2

System Error Log

1 total page

Corrective Action | Detail | Refresh | Back

Figure 31 System error log

4.3.1.3 Plant event log

Select **PLANT LOG** to view the plant event log (Figure 32). To display the statistics of a plant log (Figure 33), select an entry from the list and select **STATISTICS**. Select **DETAIL** to view the user and date when the data was cleared (Figure 34).

Plant Event Log

From Date/Time	To Date/Time	Name	Priority	# of Occurrences
05-25-2007 11:50:21	05-25-2007 11:50:21	UNKNOWN0010	ALARM	1
05-25-2007 11:48:20	05-25-2007 11:48:20	UNKNOWN0008	ALARM	1
05-25-2007 11:48:20	05-25-2007 11:49:22	UNKNOWN0009	ALARM	2
05-25-2007 11:47:20	05-25-2007 11:47:20	UNKNOWN0009	ALARM	1
05-25-2007 11:44:21	05-25-2007 11:46:20	UNKNOWN0008	ALARM	3
05-25-2007 11:41:20	05-25-2007 11:43:21	UNKNOWN0007	ALARM	3
05-25-2007 11:37:20	05-25-2007 11:40:19	UNKNOWN0006	ALARM	4
05-25-2007 11:33:20	05-25-2007 11:36:20	UNKNOWN0005	ALARM	4
05-25-2007 11:30:18	05-25-2007 11:32:20	UNKNOWN0004	ALARM	3

1 total page

Statistics | Detail | Refresh | Back

Figure 32 Plant event log
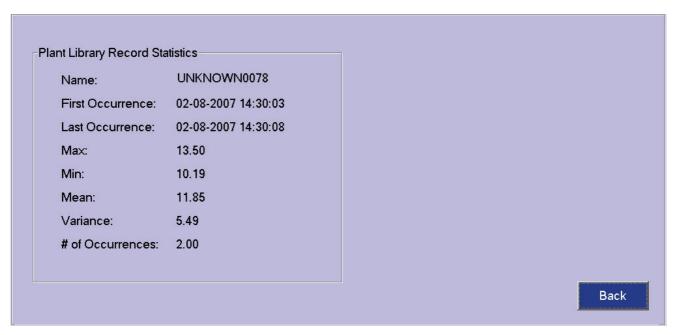
Figure 33 Plant library statistics

Figure 34 Plant library detail

In the Plant Library Detail screen, select an entry and select **VECTOR DATA** to display the parameter deviations that caused the event (Figure 35 on page 46). Vector data provides a quick view of what changed in the system for a specific plant event.
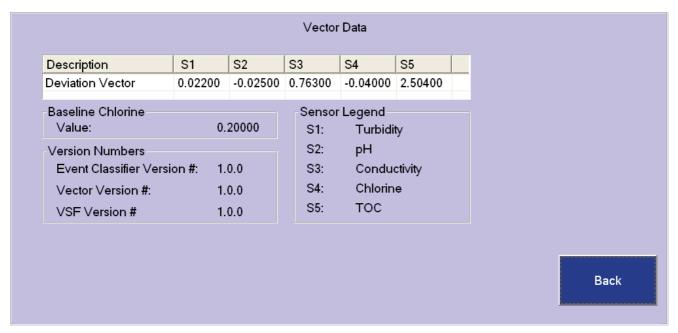
Figure 35 Plant library vector data

4.3.1.4 Sensor data log

Select **SENSOR DATA** from the Maintenance Menu to view all the sensors and their values (Figure 36). Select **REFRESH** to view the current status of the sensors.
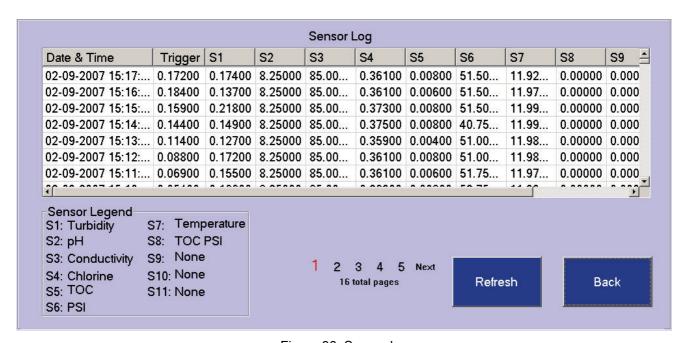

Figure 36 Sensor log

4.3.1.5 User activity log

Select **USER ACTIVITY** from the Maintenance Menu to view the date and time, user name, menu class, screen category and associated activity of the user (Figure 37).

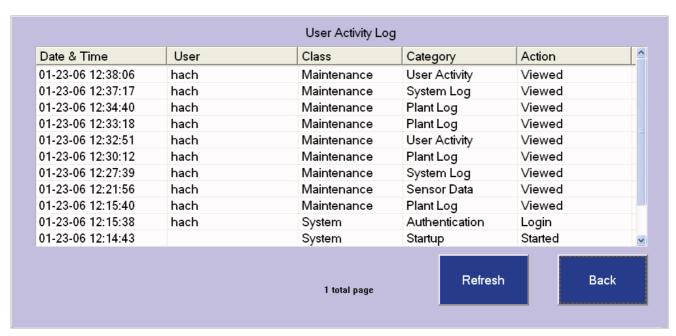| User Activity Log					
Date & Time	User	Class	Category	Action	
01-23-06 12:38:06	hach	Maintenance	User Activity	Viewed	
01-23-06 12:37:17	hach	Maintenance	System Log	Viewed	
01-23-06 12:34:40	hach	Maintenance	Plant Log	Viewed	
01-23-06 12:33:18	hach	Maintenance	Plant Log	Viewed	
01-23-06 12:32:51	hach	Maintenance	User Activity	Viewed	
01-23-06 12:30:12	hach	Maintenance	Plant Log	Viewed	
01-23-06 12:27:39	hach	Maintenance	System Log	Viewed	
01-23-06 12:21:56	hach	Maintenance	Sensor Data	Viewed	
01-23-06 12:15:40	hach	Maintenance	Plant Log	Viewed	
01-23-06 12:15:38	hach	System	Authentication	Login	
01-23-06 12:14:43		System	Startup	Started	

1 total page

Refresh   Back

Figure 37 User activity log

Operation

Table 8 details all of the user activities that are recorded in the user activity log.

Table 8 User activity log status

Menu class	Screen category	Actions
System	Authentication	Login, Logout
Annunciation	Agent	Select All, Cleared
	Plant	Select All, Cleared
	System	Select All, Cleared
	Sensor	Select All, Cleared
Configuration	Sensor Alarms	Viewed, Updated
	Event Monitor	Viewed, Updated
	Site Info	Viewed, Updated
	Users	Viewed
	Users Add	Viewed, Added
	Users Delete	Viewed, Deleted
	Users Role Added	Viewed, Added
	Users Role Modify	Viewed, Updated
	Users Role Delete	Viewed, Deleted
	Password	Viewed, Updated
	Logging	Viewed, Updated
	Digital Com	Viewed, Updated
	Information	Viewed, Updated
Maintenance	Sensor Log	Viewed
	System Log	Viewed
	Plant Log	Viewed
	Agent Log	Viewed
	Sensor Data	Viewed
	User Activity	Viewed
	File Save	Viewed, Exported
	Plant Library	Viewed
	Plant Library Add	Viewed, Add
	Plant Library Edit	Viewed, Edit
	Plant Library	Delete
	Disable	Viewed, Disabled
	Shutdown	Viewed, Shutdown
	Reset	Viewed, Selected
	Sample Now	Viewed, Selected
	Install Library	Viewed
	Install EM	Viewed
	Import/Export Database	Viewed, Exported
	License	Viewed

4.3.2 Transferring data

Data can be sent from the Event Monitor in real time or downloaded to a USB memory device for transfer to a PC.

4.3.2.1 Real-time data transfer

Sensor data can be transferred in real time from the Event Monitor to a SCADA system via a Modbus RS485 connection. See Figure 7 on page 20 for wiring and Appendix B of the GuardianBlue User Manual for register maps. The Event Monitor acts as a slave during data transfer.

4.3.2.2 Data log transfer

Data logs can be downloaded to a USB memory device and then transferred to a PC:

1. Plug a USB key into the USB connector (Figure 1 on page 10).

2. From the Maintenance Menu, select **FILE SAVE**. The Export Log Files screen will be displayed (Figure 38 on page 50).

3. Enter a description for the file (for example, location, or date the data was downloaded) in the Prefix to Exported Files text box.

4. Select the data logs to export (all data logs are selected by default).

5. Select the Export to USB box.

6. Select the Eject USB Device on Exit if desired.

7. Select the time period for the download:

    • **Export from last download point**: select to download data that has not been previously exported. Selecting **RESET** removes the previous download and will export all data currently in the database.

    • **Specify Start and End dates**: select to specify a time period for the download. Use the down arrows to specify the Start Date and End Date.

8. Select **EXPORT** and wait for the data to download.

9. Remove the USB key.

10. The data is saved as a .csv file on the USB key. Plug the USB key into a PC and open the .csv file in Microsoft® Excel® spreadsheet software or a similar application.
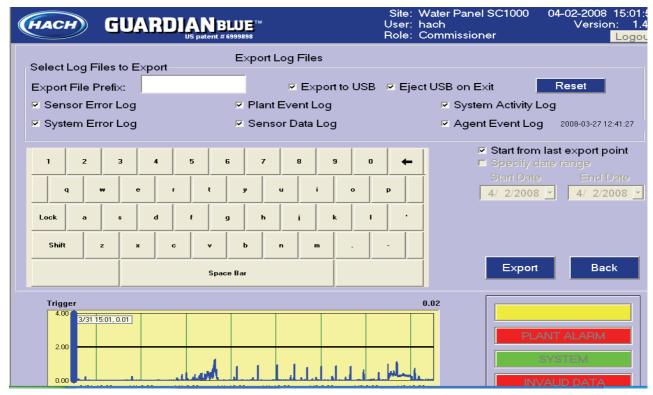
Figure 38 Export log files

4.3.2.3 Database transfer

Use the export and import database option to transfer data from one Event Monitor to another. Transferring the data may be preferable to establishing a new library or to setting up users and roles in multiple Event Monitors.

1. Plug a USB key into the USB connector. Refer to Figure 1 on page 10.

2. From the Maintenance Menu, select **DATABASE**. The Manage Database screen will be displayed (Figure 39).

    Note: The Database History section will show all previous databases that have been installed.

3. Select **Export** or **Import** from the Database Export/Import section.

4. Select the database items to export/import:

    •   Entire Database—transfer the complete database.

    •   Plant Library Data—transfer only the data in the Plant Library. This is useful when installing an Event Monitor that is located near an existing monitor.

    •   User Data—transfer only users and roles data.

5. Select **EXPORT** or **IMPORT**.

    •   **EXPORT**: the message "The system will stop polling while the database is being exported. Proceed?" will be shown. The Event Monitor will stop collecting data during the export. Select **OK** to stop data collection and proceed with the transfer.

    •   **IMPORT**: the message "The current system data will be overwritten during the import process. Proceed?" will be shown. Select **OK** to overwrite the existing database and proceed with the transfer.

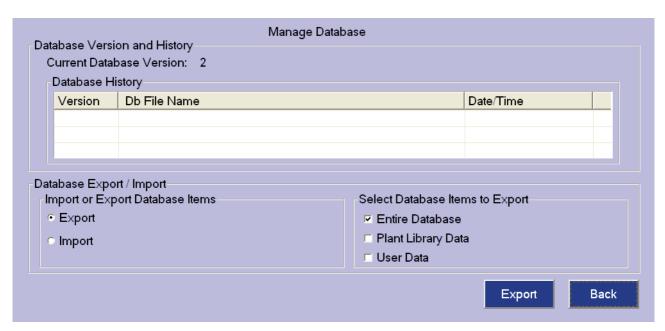   •   Wait for the data to be transferred. Remove the USB key.

Figure 39 Database import/export

4.4 Event Monitor maintenance options

Use the maintenance options to enter license information, turn off the trigger signal, reset the baseline, take a sample, shut down the Event Monitor or install a software update.

4.4.1 License information

Use the License Management screen to enter the license key information for the Event Monitor Trigger System or the GuardianBlue Event Monitor. The expiration date and days remaining will be shown (Figure 40).

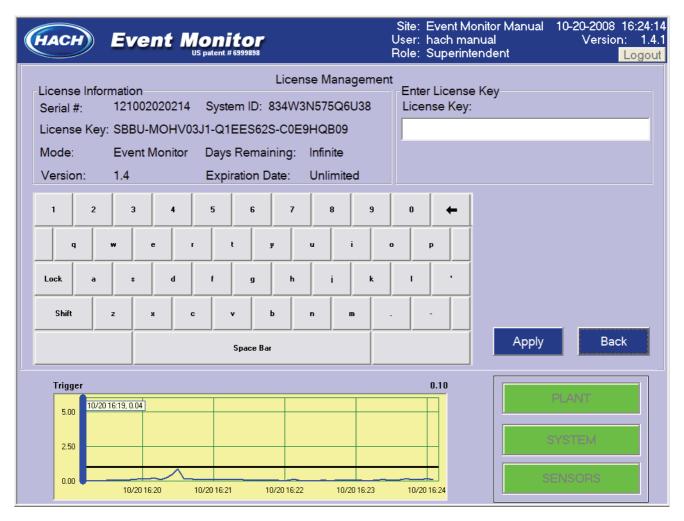*Note: The Event Monitor must be restarted for the new license key to take effect.*

Figure 40 License management

4.4.2 Disable the trigger signal

The trigger signal can be turned off to prevent plant events from occurring during routine maintenance.

1. From the Maintenance screen, select the **DISABLE** button.

*Note: If the trigger signal is already disabled, the **ENABLE** button will be displayed.*

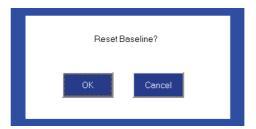**2.** A message box will be displayed requesting confirmation.

3. Select **OK** to disable the trigger signal.

4. When maintenance is complete, select **ENABLE>OK** to return the trigger signal to normal operation.

4.4.3 Reset the baseline

If the trigger signal was not disabled during maintenance, or if a known temporary operation caused a significant change in sensor readings, the baseline should be reset to return the Event Monitor to normal operation.

1. From the Maintenance screen, select the **RESET** button.

2. A message box will be displayed requesting confirmation.

3. Select **OK** to reset the baseline. The Event Monitor will establish the baseline using current sensor data.

4.4.4 Collect a sample

The autosampler (optional) is normally set up to collect a sample when a plant event or agent event occurs, but can be triggered to collect a sample at any time.

1. From the Maintenance screen, select the **SAMPLE NOW** button.

2. A message box will be displayed requesting confirmation.

3. Select **OK** to begin sample collection.

4.4.5 Install Event Monitor updates

To install updates to the Event Monitor software, select the **INSTALL EM** button from the Maintenance screen. Follow the on-screen instructions (Figure 41).
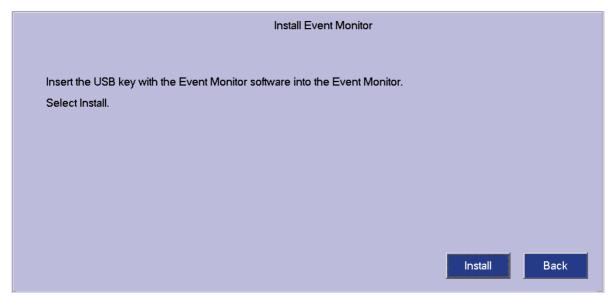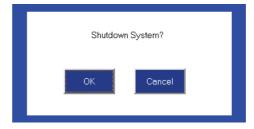

Figure 41 Upgrading the Event Monitor software

4.4.6 Shut down the Event Monitor

To shut down the Event Monitor software:

1. From the Maintenance screen, select **SHUTDOWN**.

2. A message box will be displayed requesting confirmation.

3. Select **OK** to shut down the Event Monitor software.

4.4.7 Manage the Plant Library

Plant events that occur during normal operation are stored in the plant event library. Each unknown event listed in the plant event library is due to a trigger signal that exceeded the threshold value.

If the cause of a plant event can be associated with a known seasonal or operational change, the event should be named in the plant event library and assigned a priority level. See section 4.6 on page 62 for more information on determining the root cause of plant events.

For example, an unknown plant event displayed as UNKNOWN0001 can be named "Source Water 2" and the priority changed from Alarm to Normal. See Figure 43.

4.4.7.1 Developing a plant library

The plant library stores information gathered during normal operation. During initial installation the plant library is empty. Events are added to the plant library as they occur. A plant event occurs when the trigger signal exceeds the plant event threshold value. To develop the most effective system, provide insight into operational events and gain the maximum benefit from the system, identify the root cause of plant events whenever possible (see).

Note: The Event Monitor stores information in the plant library. If the system is moved to a different location, flush the database from the commissioner menu. A new baseline development period is required.

To access the plant event library, select **PLANT LIBRARY** from the Maintenance Menu. The View Plant Library screen will be displayed (Figure 42).
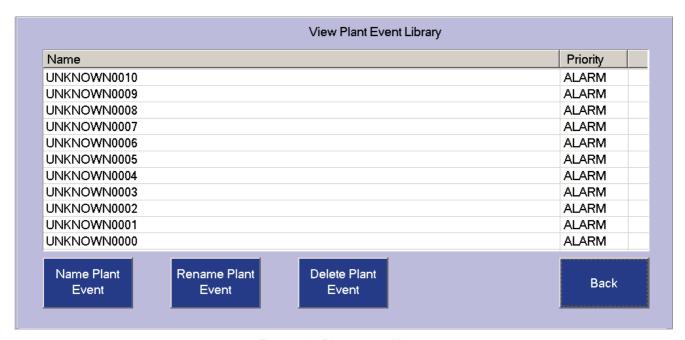
View Plant Event Library		
Name	**Priority**	
UNKNOWN0010	ALARM	
UNKNOWN0009	ALARM	
UNKNOWN0008	ALARM	
UNKNOWN0007	ALARM	
UNKNOWN0006	ALARM	
UNKNOWN0005	ALARM	
UNKNOWN0004	ALARM	
UNKNOWN0003	ALARM	
UNKNOWN0002	ALARM	
UNKNOWN0001	ALARM	
UNKNOWN0000	ALARM	

| Name Plant Event | Rename Plant Event | Delete Plant Event | Back |

Figure 42 Plant event library

4.4.7.2 Naming plant events

When the root cause of an unknown plant event has been identified, the plant event should be named so that a recurrence can be identified quickly. Complete the following steps to name a plant event.

1. Select **MAINTENANCE**>**PLANT LIBRARY** from the main screen.

2. Select **NAME PLANT EVENT**.

3. Drag the x-axis until the event is in view, or select the time period containing the event using the **SET START/END TIME** button. If necessary, select **SET AXES** to change the range of the x-axis. Drag the y-axis to change the upper limit of the y-axis, if necessary.

4. Slide the black cursors from the left and right side of the screen to bracket the event (Figure 43 on page 56). To expand the x-axis, select **SET EVENT RANGE**. The scale of the x-axis will change and the cursors will be reset to the left and right sides of the screen. Repeat the bracketing of the event, if necessary.

Note: To view individual trigger points, select Show Trigger Markers.

5. When the event is bracketed, enter the name for the event using the keypad (Figure 43). The name should be recognizable by all operators.

6. Select the priority level using the drop-down list:

    • **Alarm**—requires immediate investigation.

    • **Alert**—requires investigation.

    • **Normal**—no investigation required. The event is due to normal operating conditions, such as a valve opening or closing. The event will still be logged.

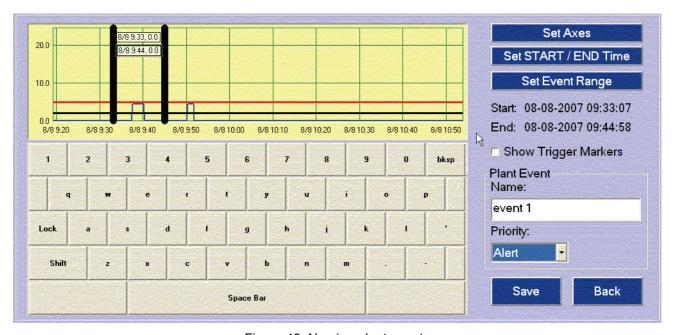7. Select **SAVE**>**OK**>**BACK** to save the settings and return to the plant library.

Figure 43 Naming plant events

4.4.7.3 Renaming plant events

1. Select **MAINTENANCE**>**PLANT LIBRARY** from the main screen.

2. Select **RENAME PLANT EVENT**.

3. Highlight the name and enter the new name using the keypad (Figure 44).

4. Select the priority level using the drop-down list (section 4.4.7.2 on page 55).

5. Select **SAVE**>**OK**>**BACK** to save the settings and return to the plant library.
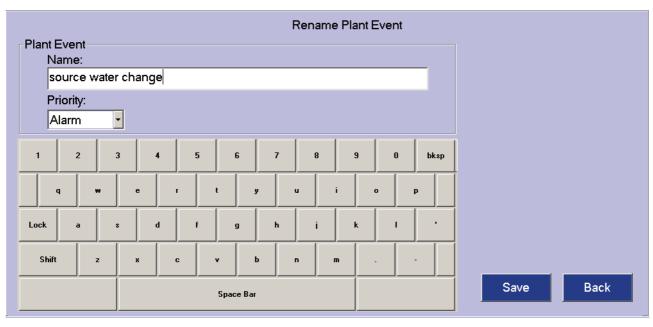
Figure 44 Rename plant events

4.4.7.4 Deleting plant events

1. Select **MAINTENANCE**>**PLANT LIBRARY** from the main screen.

2. Highlight the plant event from the list and select **DELETE PLANT EVENT**.

3. A message box will be displayed requesting confirmation.

4. Select **OK** to delete the selected plant event.

4.5 Understanding plant and agent alarms

The Event Monitor contains algorithms that analyze current water quality data once per minute and calculates a dimensionless trigger signal. The measured water quality parameters are used to calculate the water quality baseline. The trigger signal indicates the magnitude of deviation from the baseline. If the trigger signal magnitude is greater than the user-set threshold, an alarm occurs.

When the water quality data are benign, no alarm is given. During such times, the system builds a baseline of the expected water quality at the installation site.

The Event Monitor analyzes data from the sensors for the following purposes:

•   Find unusual water quality changes.

•   Trigger an alarm if the changes exceed a threshold.

•   Search libraries of event fingerprints to see if the event can be classified.

4.5.1 Event trigger algorithms

Water quality signals are mathematically processed to derive a single variable called the trigger signal. Having all the data reduced to just one variable greatly simplifies the analysis of the data.

If the water quality changes in the system are minor, the trigger signal has a small value (< 1). As the magnitude of the changes increase, the value of the trigger signal increases. The trigger signal is compared to a trigger signal threshold parameter each minute (Figure 45 on page 58).

If the trigger signal exceeds the threshold, an alarm occurs. The presence of an alarm leads to further processing in an attempt to classify the cause of the alarm. If the pattern of water quality deviations fits a pattern found in a library of fingerprints, the event is presumptively classified.

The event is characterized in the following order:

    a. Match to Agent Library?

    b. If not, match to a named plant event?

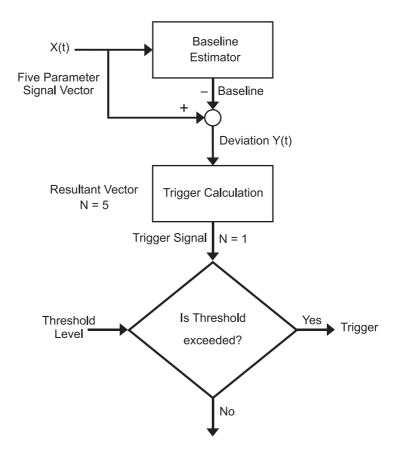   **c.** If not, classify as an unknown plant event.

Figure 45 Trigger signal algorithm

4.5.1.1 Method limitations

This method is interpretive. It does not depend on specific chemical sensors to find a given agent. The method is based on chemical responses across five fundamentally different water quality parameters.

If the system reports cyanide in the water, it does not indicate that a cyanide sensor has reported the presence of cyanide. A cyanide report means only that a chemical's 5-dimensional fingerprint in water has a pattern that is very similar to that of cyanide in the Agent Library. The alarm should be considered tentative until a chemical analysis confirms or denies the presence of the reported agent.

The classification of an agent by the system offers a valuable first pass at determining the cause of a water quality upset and can be used to direct further chemical analysis. If the alarm were classified as cyanide, it would be logical to run further tests to confirm or deny the presence of cyanide rather than for unrelated analytes such as heavy metals. The

classification part of the algorithm should be treated as a tool to help guide further analysis.

A corollary of the method is that multiple agents could be reported for one event because all of the reported agents have similar chemical fingerprints. When the agent(s) are reported, each name is associated with a probability of match. High probabilities suggest good match criteria, while low probabilities suggest weak match criteria.

The chemistries of some highly toxic chemicals are very similar to those of some low-toxicity chemicals. The method does not measure toxicity, so additional testing would be necessary to assess the actual toxicity of the water. Emergency response kits are available to help assess the nature of the agent (section 4.6.6 on page 64).

4.5.2 Library databases

4.5.2.1 Plant library of event fingerprints

The Event Monitor contains a database called a Plant Library. This database contains the event fingerprints generated when the Event Monitor alarms. Each fingerprint is made up of the water quality parameter deviations present during an event.

When the Event Monitor is delivered to a site and commissioned, there are no event signatures in the Plant Library. The signatures will be generated over time at the installation site and will be specific to that site.

The contents of the Plant Library can be examined from the plant log (section 4.3.1.3 on page 44).

4.5.3 Operational vs. agent fingerprints

When the system alarms, one of the first questions will be "is it an agent attack, or just an operational problem?" This question can usually be resolved by looking at the graph of the trigger signal over time. Alarms that are "spikes" of a few minutes duration are of less concern in theory because deviations lasting only a few minutes suggest that only a small volume of water may be affected.

On the other hand, a change that is continuous and persistent is of major concern because it probably represents a large volume of changed water. Alarms that are generated by such fingerprints should be investigated with urgency.

Operational fingerprints
Operational problems usually present a noisy or erratic trigger signal graph (Figure 46 and Figure 47 on page 60). Sometimes the trigger signal shows a relatively brief spike.
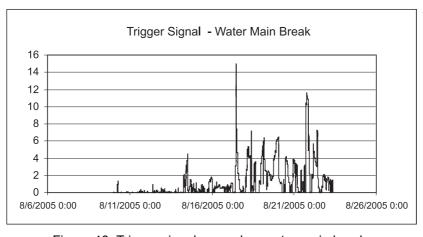

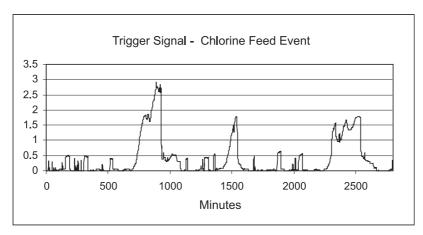Figure 46 Trigger signal example—water main break

Trigger Signal - Chlorine Feed Event

Figure 47 Trigger signal example—chlorine feed event

Agent fingerprints

An actual injection of an agent will usually present a characteristic fingerprint and a more pronounced trigger signal value. The fingerprint has a characteristic rise time and plateau of stabilization, then a drop-off when the contaminated water has passed the measuring point and has been replaced with uncontaminated water (Figure 48).
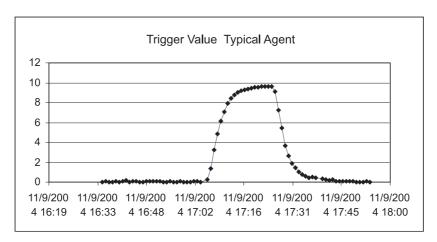
Trigger Value Typical Agent

Figure 48 Trigger signal example—typical agent

Alarms that are associated with this kind of pattern should be taken seriously. Even if no agent is reported, it is possible that what is present is a contaminant which is not represented in the agent library.

It is possible that this kind of fingerprint will produce classification of different agents on the signal rise, plateau and fall. Classifications on the rise and fall are not as reliable as those from the plateau of the response. This should be taken into account during the interpretation of the alarm.

4.5.4 Associating a plant event with a root cause

The Event Monitor allows the operator to associate a name and alarm priority with a plant event. Once the plant event is identified, it should be named so that a recurrence can be identified quickly. Information on the root cause of plant events can be used to reduce the occurrence of such events. Determining the root cause of plant events is detailed in section 4.6 on page 62.

Example 1—pump cycle caused plant alarm
A water panel and an Event Monitor were installed at a location in a city just downstream from a water storage tank. The Event Monitor recorded a plant alarm (Figure 49).
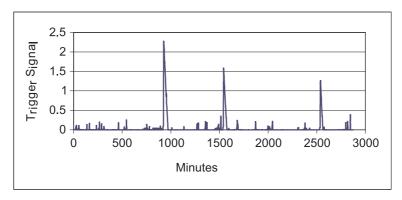

Figure 49 Alarm example 1

Careful evaluation of the baseline parameter data showed that a chlorine upset was triggering the alarms. The chlorine levels would gradually rise over time and then suddenly drop (Figure 50).
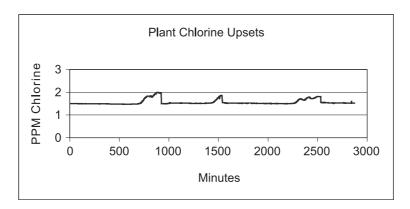

Figure 50 Alarm example 1—analysis

The sudden drop in chlorine levels was triggering the alarm. Further investigation revealed that a change in source water was causing the drop in chlorine levels. The storage tank was normally filled from water source A, but at times of peak demand both source A and source B were turned on to fill the tanks.

Source B had a higher chlorine residual than source A, and when source B was turned on, the chlorine level slowly increased. When source B was turned off, the chlorine level dropped rapidly to the concentration of source A.

After the root cause was found, the plant event was named so that future recurrences would be quickly recognized. Future recurrences were displayed in the plant event log as:

Name	Priority
PUMP B OFF	NORMAL

Example 2—incorrect caustic caused plant alarm
A plant used a caustic feed such as hydroxide to control water pH. A trigger alarm occurred (Figure 51 on page 62). The root cause was found to be overfeed of the caustic.

The overfeed was due to using the incorrect concentration of caustic that had been delivered by the vendor. Determining the root cause of this event led to the development of controls for incoming chemicals to prevent a recurrence.
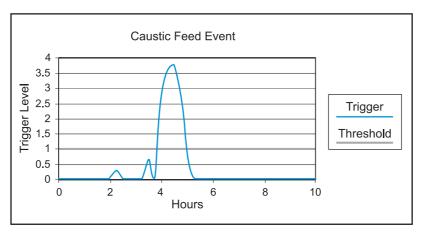

Figure 51 Alarm example 2

4.6 Responding to an unknown alarm

When the Event Monitor triggers an alarm, there could be many possible causes, such as normal events or operational upsets. The equipment and water quality must be examined to understand the problem and qualify the result.

4.6.1 Verify sensor operation

Proper sensor function should be investigated initially as the possible cause of plant alarms.

Check the following:

* Are there any sensor errors (Table 6 on page 27) that might cause the alarm?

* Are all sensors functioning normally? Examine the graphs of the sensor readings prior to the alarm. Are there any unusual changes in the values?

* Have the sensors been properly maintained?

* Are any reagent containers empty? Running out of reagent can shift readings and trigger an alarm.

* Have flow rates changed? Check the PSI graph to see if there has been any unusual pressure pattern that might affect flows.

4.6.2 Verify sampling system

If all of the sensors are operating without problems, then the sampling system should be checked.

* Are there any blockages or leaks in the sampling system?

* Has the sampling system been shut off?

* Are there air bubbles in the sample line?

* Has the system been tampered with or vandalized?

4.6.3 Examine Event Monitor data

Verify the following:

- Is there a loss of communications?
- Are there sensor alarms (high, low, frozen?)
- Is there a low-pressure alarm from the TOC analyzer?
- Are there any sensor diagnostic messages?

4.6.4 Analyze water conditions

If the problem cannot be attributed to the equipment or communications, then the alarm is likely caused by a real change in water conditions. A key question then becomes: is the cause attributable to known operations, or is it something unknown?

Data needs to be gathered regarding the operations upstream of the sampling point to see if there is any rational explanation for the change in water quality.

Check the following:

- Have there been unusual weather conditions?
- Has work been done on or near water mains?
- Have there been changes in plant operations?
- Are different treatment chemicals being used?
- Has there been a change in the corrosion control program (dose, compound, etc.)?
- Was maintenance performed on the plant or distribution system?
- Have there been unusual water demands (major fire fighting or hydrant flushing, for example)?
- Was there a water main break?
- Are control systems for pH or chlorine functioning normally?
- Was there a change in source water (for example service from a neighboring utility interconnect, backflow from another source due to maintenance, etc.)?
- Are other monitoring sites responding in a similar manner and is the response distribution such that it could indicate a change in the source water?
- Has the event happened elsewhere up-stream of the location?
- Has the event been seen downstream of the location?

If the cause of the plant alarm is discovered, the operator can assign a name and priority to the event in the plant library (). Names and priorities should only be assigned if the root cause of an event has been found.

4.6.5 Classifying unknown events

If no obvious cause for the alarm can be found, then the question becomes: is this change in water quality harmful or not? Is it deliberate?

Test for toxicity
Water samples can be taken and analyzed for toxicity. The utility should have adequate safety measures in place to handle samples that could be toxic or infectious.

Evaluate volume of affected water

Deviations lasting only a few minutes suggest that only a small volume of water may be affected. A change that is continuous and persistent probably represents a large volume of changed water.

Chemical analysis of classified agents

If the Event Monitor presents a classification of an agent, this classification should be treated as tentative until verified by further testing. Classification of an agent by the system offers a valuable first pass at determining the cause of a water quality upset and can be used to direct further forensic analysis.

Tests should be tailored to address the class of agent being presented by the match to the Agent Library. These matches are not necessarily exact. For example a match to Ethoprophos may not necessarily be Ethoprophos but could be another organophosphate with a fingerprint similar to Ethoprophos that is not in the Agent Library. It would be a good idea in this case to begin testing to verify this class of compounds (organophosphates) and get more specific as testing continues. Agent library updates can be obtained through a subscription service.

Chemical analysis of unclassified agents

Although an alarm may not be classified by a match to an agent in the Agent Library, the alarm may not necessarily be benign. There are thousands of contaminants that could potentially be introduced into the distribution system by deliberate or accidental means.

The Agent Library contains a subset of some of the most dangerous and likely compounds. Many others are not contained in the library. The ability of the system to alert on potentially dangerous compounds that are not in the Agent Library is one of the great strengths of the system.

While no classification is given on these types of alarms, the information presented by the individual parameters being measured can be important in guiding forensic analysis. For example if an alarm occurs due to changes in conductivity alone with no noticeable change in TOC or chlorine demand, it would not be logical to test for organic compounds. Such common sense in conducting tests can save valuable time in an emergency.

4.6.6 USEPA guidance on responding to events

The USEPA offers guidance on forensic testing in their emergency response protocols. Both core and advanced field-testing can be performed on the collected samples as well as sending samples to the laboratory for more in depth analysis. Hach provides ready to use kits for core field-testing (Cat. No. 2884100) and advanced field-testing including toxicity testing (Cat. No. 2886800). High consequence actions such as alerting customers or shutting down water supplies should not be taken until verification of the results from the Event Monitor have been performed.

The USEPA has performed extensive research in the area of response protocols and has developed a number of useful tools for formulating response plans. Chief among these is a manual entitled *Response Protocol Toolbox: Planning for and Responding to Drinking Water Contamination Threats and Incidents*. It is available online at http://cfpub.epa.gov/safewater.

The protocol recommends initiating action based upon the Incident Command System (ICS). Under this system the utility names a Water Utility Emergency Response Manager (WUERM) that takes control of an incident from its onset. The USEPA guidance is very detailed and includes copies of many forms and procedures that could be useful in initiating a response.

Section 5   Maintenance

DANGER
Only qualified personnel should conduct the maintenance tasks described in this section of the manual.

DANGER
Seul le personnel qualifié doit effectuer les tâches de maintenance détaillées dans cette section du manuel.

5.1 General Maintenance

5.1.1 Cleaning the Instrument

The external surfaces of the enclosure may be cleaned with a soft cloth. Grime and dirt can be removed with water and a mild detergent, wiping surfaces dry after cleaning.

The computer touchscreen can only be cleaned with a soft cloth and gentle wiping.

5.1.2 Three-Month Maintenance

Perform the following maintenance checks every three months:

Internal Components

- Verify the cooling fan is operational.
- Verify all cable connections are securely fastened.
- Check door seals for nicks, breaks, or loosened mounting adhesive.
- Verify all conduit and cable connections are secure.
- Check all cables for nicks, frayed or damaged insulation.
- Verify cables are clear of any sharp edges and loop correctly when the door is closed.

External Components

- Check for loose mounting screws or worn or broken vibration isolators.
- Check for cracks or a loose display window.

5.2 ⚠ Fuse Replacement

DANGER
Remove power from the instrument when removing or installing a fuse.

DANGER
Couper l'alimentation de l'instrumentavant de déposer ou de poser un fusible.

DANGER
For continued protection against fire hazard, replace the fuse only with a fuse of the same type and rating.

DANGER
Pour la protection prolongée contre le risque d'incendie, ne remplacer le fusible que par unautre du même type et calibre.

The instrument contains two fuses. Failed fuses are an indication that an equipment problem could exist. Problem resolution and fuse replacement should be performed only by qualified service personnel.

To replace a failed fuse, refer to Figure 52 and do the following:

1. Disconnect power to the instrument.

2. With a flat-blade screwdriver, turn the Event Monitor door latch counter-clockwise. Open the door.

3. Pull straight up on the tab of the fuse holder to remove it.

4. Remove the defective fuse from the holder and install a new fuse of the same type and rating (T, 5A, 250V).

5. Press the fuse holder down into its body (Figure 52).

6. Close the Event Monitor door and turn the latch mechanism.
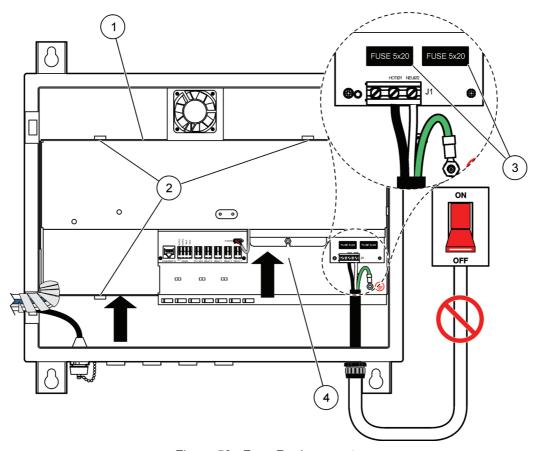
7. Connect power to the instrument.

Figure 52 Fuse Replacement

1	Wiring cover	3	Fuse holders (2x)
2	Wiring cover tabs (3x)	4	Wiring cover nut

Section 6   Parts and Accessories

6.1   Replacement Parts and Accessories

Description	Quantity	Catalog Number
5mm x 20mm time delay fuses (T, 5A, 250V)	each	4693800
Free standing rack, wheeled, for rack mounting the Event Monitor	each	5981050
Event Monitor Trigger System	each	6950000
Event Monitor Trigger System Installation Kit	each	58672-00
Event Monitor Trigger System Manual, English	each	DOC026.53.xxxxx
Eclox Rapid Response Water Test Kit	each	2886800
USB memory stick	each	6958000
Water Distribution Monitoring Panel		
Panel in Wall Mount Enclosure, NEMA 12	each	59810-00
Water Distribution Monitoring Panel includes pH, CL17 chlorine, conductivity, 1720D	each	59800-00
WDM astroTOC UV cold rolled steel, 25 mg/L 1 UV w/ SIM	each	H-6195-1030
WDM astroTOC UV cold rolled steel, 25mg/L, 1 UV w/SIM	each	H-6195-1030DS
WDM astroTOC UV stainless steel 25 mg/L 1 UV w/ SIM	each	H-6195-3030
PipeSonde		
PipeSonde In-Pipe Probe	each	PS5BASE
PipeSonde In-Pipe Probe with Chlorine	each	PS5BASECHLORINE
Autosampler		
900 Max Refrigerated Sampler with Interface to PipeSonde Probe	each	007183
900 Max All-Weather Refrigerated Sampler with interface to PipeSonde Probe	each	007184

Section 7   How to Order

U.S.A. Customers

By Telephone:

6:30 a.m. to 5:00 p.m. MST
Monday through Friday
(800) 604-3493

By Fax:

(970) 669-2932

By Mail:

Hach Company
P.O. Box 389
Loveland, Colorado 80539-0389 U.S.A.

Ordering information by e-mail: orders@hach.com

Information Required

- Hach account number (if available)
- Your name and phone number
- Purchase order number
- Brief description or model number
- billing address
- Shipping address
- Catalog number
- Quantity

Technical and Customer Service (U.S.A. only)

Hach Technical and Customer Service Department personnel are eager to answer questions about our products and their use. Specialists in analytical methods, they are happy to put their talents to work for you.

Call 1-800-604-3493 or e-mail techhelp@hach.com

Section 8   Repair and Service

Authorization must be obtained from Hach Company before sending any items for repair. Please contact the Hach Service Center serving your location.

In the United States:

Hach Company
Ames Service
100 Dayton Avenue
Ames, Iowa 50010
(800) 604-3493 or (970) 669-3050
FAX: (515) 232-3835

Section 9   Warranty

Hach Company warrants this product to the original purchaser against any defects that are due to faulty material or workmanship for a period of one year from date of shipment.

In the event that a defect is discovered during the warranty period, Hach Company agrees that, at its option, it will repair or replace the defective product or refund the purchase price, excluding original shipping and handling charges. Any product repaired or replaced under this warranty will be warranted only for the remainder of the original product warranty period.

This warranty does not apply to consumable products such as chemical reagents; or consumable components of a product, such as, but not limited to, lamps and tubing.

Contact Hach Company or your distributor to initiate warranty support. Products may not be returned without authorization from Hach Company.

Limitations

This warranty does not cover:

*   Damage caused by acts of God, natural disaster, labor unrest, acts of war (declared or undeclared), terrorism, civil strife or acts of any governmental jurisdiction

*   Damage caused by misuse, neglect, accident or improper application or installation

*   Damage caused by any repair or attempted repair not authorized by Hach Company

*   Any product not used in accordance with the instructions furnished by Hach Company

*   Freight charges to return merchandise to Hach Company

*   Freight charges on expedited or express shipment of warranted parts or product

*   Travel fees associated with on-site warranty repair

This warranty contains the sole express warranty made by Hach Company in connection with its products. All implied warranties, including without limitation, the warranties of merchantability and fitness for a particular purpose, are expressly disclaimed.

Some states within the United States do not allow the disclaimer of implied warranties and if this is true in your state the above limitation may not apply to you. This warranty gives you specific rights, and you may also have other rights that vary from state to state.

This warranty constitutes the final, complete, and exclusive statement of warranty terms and no person is authorized to make any other warranties or representations on behalf of Hach Company.

Limitation of Remedies

The remedies of repair, replacement or refund of purchase price as stated above are the exclusive remedies for the breach of this warranty. On the basis of strict liability or under any other legal theory, in no event shall Hach Company be liable for any incidental or consequential damages of any kind for breach of warranty or negligence.

Section 10   Canadian & US Electromagnetic Interference

Canadian Interference-causing Equipment Regulation, ICES-003, Class A

This Class A digital apparatus meets all requirements of the Canadian Interference-causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

FCC PART 15, CLASS "A" Limits

The device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and

2. This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designated to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at the user's own expense. The following techniques of reducing the interference problems are applied easily.

1. Disconnect the equipment from it's power source to verify that it is or is not the source of the interference.

2. If the equipment is connected into the same outlet as the device with which it is interfering, try another outlet.

3. Move the equipment away from the device receiving the interference.

4. Reposition the receiving antenna for the device receiving the interference.

5. Try combinations of the above.